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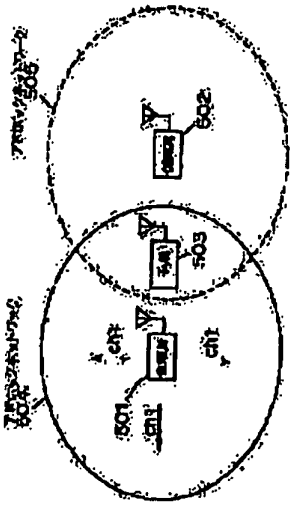
(54) MOBILE COMMUNICATION SYSTEM AND METHOD FOR AVOIDING ASYNCHRONOUS INTERFERENCE

(57)Abstract:
PROBLEM TO BE SOLVED: To avoid the occurrence of asynchronous interference in a part on which two radio zones constituted of respectively different master stations are overlapped.
SOLUTION: Virtual master stations 501, 502 are located on positions where mutual signals can't be received and a slave station 503 is located on a part where areas covered by respective virtual master stations 501, 502 are overlapped. If the virtual master station 502 sends an interference inspection signal by a certain fixed number of times in order to try communication by using a channel ch1 when the virtual master station 501 communicates with the slave station 503 by using the channel ch1, errors are generated in the slave stations 503 by the fixed number of times and sends an interference notification signal. The virtual master station 502 receiving the interference notification signal understands the occurrence of asynchronous interference in the area covered by the station itself, judges that the channel ch1 can't be used and executes communication by using the other channel.



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CLAIMS

[Claim(s)]

[Claim 1] In the migration communication system which consists of child offices which are communicating by the communication mode using TDMA between two or more key stations and said key station The interference investigation signal for investigating whether in case it is going to use a certain channel, asynchronous interference occurs in the channel of the use schedule is sent out to the channel of said use schedule. When [which carried out count reception] the notice signal of interference which notifies the purport which asynchronous interference generates in the receiving slot corresponding to the sending-out slot of this interference investigation signal is received or an error packet is able to be defined beforehand The key station which judges with asynchronous interference having occurred and uses channels other than said use schedule channel, Migration communication system characterized by consisting of child offices which send out said notice signal of interference to said key station which judged with asynchronous interference having occurred when [which carried out count detection] an error packet was able to be defined beforehand, and has sent out said interference investigation signal.

[Claim 2] In the migration communication system which consists of child offices which are communicating by the communication mode using TDMA between two or more key stations and said key station The interference investigation signal for investigating whether in case it is going to use a certain channel, asynchronous interference occurs in the channel of the use schedule is sent out to the channel of said use schedule. When [which carried out count reception] the notice signal of interference which notifies the purport which asynchronous interference generates in the receiving slot corresponding to the sending-out slot of this interference investigation signal is received or an error packet is able to be defined beforehand The key station which judges with asynchronous interference having occurred and uses channels other than said use schedule channel, It judges with asynchronous interference having occurred, when the generating pattern of a key station of an error packet corresponds with the pattern which sends out said interference investigation signal. Migration communication system characterized by consisting of child offices which send out said notice signal of interference to said key station which has sent out said interference investigation signal.

[Claim 3] Migration communication system according to claim 2 whose pattern with which a key station sends out said interference investigation signal is a pattern which sends out an interference investigation signal for every fixed period.

[Claim 4] Migration communication system according to claim 2 which is the pattern which the pattern with which a key station sends out said interference investigation signal cannot send out an interference investigation signal for every fixed period, but sends out in the other period.

[Claim 5] Migration communication system according to claim 2 which is the pattern from which the count by which the pattern with which a key station sends out said interference investigation signal continues and transmits an interference investigation signal between the slots which do not transmit an interference investigation signal changes regularly.

[Claim 6] Migration communication system according to claim 2 which is the pattern from which the count by which the pattern with which a key station sends out said interference investigation signal continues an interference investigation signal, and does not transmit it between the slots which transmit an interference investigation signal changes regularly.

[Claim 7] Migration communication system according to claim 2 which is the count to which the pattern with which a key station sends out said interference investigation signal sends out an interference investigation signal continuously, and the pattern from which the interference investigation signal just behind that is continuously sent out, and is twisted, and a count changes regularly.

[Claim 8] The count to which the pattern with which a key station sends out said interference investigation signal sends out an interference investigation signal continuously, and migration communication system according to claim 2 it is [communication system] the pattern with which it continues, an interference investigation signal is sent out and twisted immediately after that, and a count becomes the same.

[Claim 9] Said child office is the migration communication system of eight given in any 1 term from claim 1 which sends out said notice signal of interference by the pattern set up beforehand.

[Claim 10] Migration communication system according to claim 9 whose pattern with which a child office sends out said notice signal of interference is a pattern which sends out the notice signal of interference for every fixed period.

[Claim 11] Migration communication system according to claim 9 which is the pattern which the pattern with which a child office sends out said notice signal of interference cannot send out the notice signal of interference for every fixed period, but sends out in the other period.

[Claim 12] Migration communication system according to claim 9 which is the pattern from which the count by which the pattern with which a child office sends out said notice signal of interference continues and transmits the notice signal of interference between the slots which do not transmit the notice signal of interference changes regularly.

[Claim 13] Migration communication system according to claim 9 which is the pattern from which the count by which the pattern with which a child office sends out said notice signal of interference continues the notice signal of interference, and does not transmit it between the slots which transmit the notice signal of interference changes regularly.

[Claim 14] Migration communication system according to claim 9 which is the count to which the pattern with which a child office sends out said notice signal of interference sends out the notice signal of interference continuously, and the pattern from which the notice signal of interference just behind that is continuously sent out, and is twisted, and a count changes regularly.

[Claim 15] The count to which the pattern with which a child office sends out said notice signal of interference sends out the notice signal of interference continuously, and migration communication system according to claim 9 it is [communication system] the pattern with which it continues, the notice signal of interference is sent out and twisted immediately after that, and a count becomes the same.

[Claim 16] Said key station is the migration communication system of 15 given in any 1 term from claim 1 which takes a synchronization to said notice signal of interference, and performs processing which checks that the input signal is a notice signal of interference when an error packet is received in a receiving slot.

[Claim 17] Said key station is the migration communication system of 16 given in any 1 term from claim 1 which sends out said interference investigation signal to all the transmitting slots on the carrier with which the channel of a use schedule belongs.

[Claim 18] Said key station is migration communication system according to claim 17 judged as asynchronous interference having occurred when the notice signal of interference is received in one which belongs on the carrier which has sent out the interference investigation signal of receiving slots or an error packet is received.

[Claim 19] Migration communication system of 18 given in any 1 term from claim 1 said whose interference investigation signal is a signal non-become irregular.

[Claim 20] It is the asynchronous interference evasion approach for avoiding generating of asynchronous interference generated in the migration communication system which consists of

child offices which are communicating by the communication mode using TDMA between two or more key stations and said key station. The interference investigation signal for investigating whether in case a certain channel tends to be used for said key station, in the channel of the use schedule, asynchronous interference generates it is sent out to the channel of said use schedule. It judges with asynchronous interference having generated said child office, when [which carried out count detection] an error packet is able to be defined beforehand. Said notice signal of interference is sent out to said key station which has sent out said interference investigation signal. Said key station When [which carried out count reception] the notice signal of interference which notifies the purport which asynchronous interference generates in the receiving slot corresponding to the sending-out slot of this interference investigation signal is received or an error packet is able to be defined beforehand The asynchronous interference evasion approach which judges with asynchronous interference having occurred and uses channels other than said use schedule channel.

[Claim 21] It is the asynchronous interference evasion approach for avoiding generating of asynchronous interference generated in the migration communication system which consists of child offices which are communicating by the communication mode using TDMA between two or more key stations and said key station. The interference investigation signal for investigating whether in case a certain channel tends to be used for said key station, in the channel of the use schedule, asynchronous interference generates it is sent out to the channel of said use schedule. It judges with asynchronous interference having generated said child office, when the generating pattern of a key station of an error packet corresponds with the pattern which sends out said interference investigation signal. Said notice signal of interference is sent out to said key station which has sent out said interference investigation signal. Said key station When [which carried out count reception] the notice signal of interference which notifies the purport which asynchronous interference generates in the receiving slot corresponding to the sending-out slot of this interference investigation signal is received or an error packet is able to be defined beforehand The asynchronous interference evasion approach which judges with asynchronous interference having occurred and uses channels other than said use schedule channel.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the asynchronous interference evasion approach for avoiding generating of asynchronous interference used especially in this migration communication system about the migration communication system which consists of child offices which are communicating by the communication mode which used time-division multiplexing (TDMA:TimeDivision Multiple Access) between two or more key stations and this key station.

[0002]

[Description of the Prior Art] In recent years, since migration communication system, such as a cellular phone, is spreading rapidly, the TDMA method which carries out time sharing of the same frequency circuit for the purpose of increasing the circuit capacity in the limited frequency band, and is used by two or more circuits is adopted in much migration communication system.

[0003] According to this TDMA method, the frequency more nearly same than two or more systems can be used without making an alien system generate interference, and it can communicate.

[0004] However, between the systems which are communicating using the same frequency, when a system clock frequency shifts with time amount progress, interference will occur between two systems. Such interference is called asynchronous interference. In the migration communication system which has adopted the TDMA method, since it is necessary to avoid generating of such asynchronous interference, the various asynchronous interference evasion approaches for avoiding generating of this asynchronous interference are proposed.

[0005] One of the conventional asynchronous interference evasion approaches is proposed by JP,7-67169,A. First, the configuration of the migration communication system with which this asynchronous interference evasion approach is used is shown in drawing 14 . This migration communication system consists of a wireless communication control unit 1, wireless contacts 2-5, and migration machines 6-9.

[0006] Wireless line equipment 1 is performing exchange control with a common public network or other migration communication system, and the wireless circuit in a system, migration management of a migration machine, and wireless management of a system. The wireless contacts 2-5 are supervising the radio channel while performing setup and release of a wireless circuit with the migration machines 6-9 to the bottom of management of the wireless communication control unit 1. The migration machines 6-9 are communicating through the wireless contacts 2-5 and the wireless communication control unit 1, moving in the inside of a system. Moreover, to the wireless contacts 2, 3, 4, and 5, the wireless zones 10A, 10B, 10C, and 10D are set up, respectively.

[0007] Next, the configuration of the wireless contacts 2-5 in drawing 14 is shown in drawing 15 . The wireless contacts 2-5 consist of the antenna section 101, the wireless section 102, the modem section 103, frame generation / decomposition section 104, the control channel control section 105, the communication channel control section 106, an asynchronous interference detecting element 107, the interface section 108, and a slot synchronizer 109, respectively.

[0008] The antenna section 101 is transmitting and receiving the radio signal between migration machines. The wireless section 102 is performing conversion with the radio signal transmitted and received in the antenna section 101, and the signal which are outputted and inputted from the modem section 103. The modem section 103 is performing the strange recovery to the signal outputted and inputted from the wireless section 102. Frame generation / decomposition section 104 is performing generation/decomposition of a frame while performing generation/decomposition of a TDMA signal to the baseband signaling outputted and inputted from the modem section 103. The control channel control section 105 is performing control about a control channel. The communication channel control section 106 is performing control about a communication channel. The asynchronous interference detecting element 107 performs the monitor of a radio channel, and is detecting the asynchronous interference wave. The interface section 108 is exchanging the data between the wireless communication control unit 1 and the wireless contacts 2-5. The slot synchronizer 109 extracts a slot synchronizing signal from the signal received in the interface section 108, and is controlling the slot timing of frame generation / decomposition section 104. The interface section 108 only replaces the configuration of the migration machines 6-8 with the interface section to a headset, and others including the asynchronous interference detecting element 107 are almost the same as the wireless contacts 2-5.

[0009] Next, they are explained using drawing 16 about actuation of the migration communication system which adopted this conventional asynchronous interference evasion approach, using the migration machine 6 and the wireless contact 2 as an example. Here, the migration machine 6 and the wireless contact 2 carry out to it being under communication link using the slot 2 of a frequency f1. The slot for reserve channels (in this case, slot 4) which is not usually used is prepared for the wireless contact 2, and the empty carrier is searched using that slot. The information about this empty carrier carries and is vacant into the slot 2 under communication link, and is notified to the migration machine 6 as a notice of carrier information (in this case, a frequency f2, a slot 4). When an empty carrier becomes unusable, a new empty channel is searched, updated and notified.

[0010] The wireless contact 2 measures the receiving level of two or more points of a slot during a communication link in the asynchronous interference detecting element 107, and reports the result to the communication channel control section 106 in the meantime. When the communication channel control section 106 performs asynchronous interference detection in connection with this measurement result and asynchronous interference is detected, it changes to the communication channel (a frequency f2, slot 4) notified as empty carrier information.

[0011] The migration machine 6 detects that the signal transmission which has received until now cannot receive, and changes it to the communication channel (a frequency f2, slot 4) notified beforehand. Consequently, a communication channel change is performed without using the communication channel which received interference, and cutting of a wireless circuit can be prevented. In addition, the asynchronous interference detecting element 107 can be formed in the migration machine 6 side, and can also be operated similarly.

[0012] However, there are the following technical problems in the conventional asynchronous interference evasion approach. First, the trouble in the case of it being vacant in a wireless contact side, and searching a carrier is pointed out. In this case, the empty carrier which comes out is an empty carrier in the installation of a wireless contact. Therefore, when the wireless contact 2 is using the frequency f1 and the slot 2, for example in drawing 14 , although a frequency f1 and a slot 2 are not empty carriers for the migration machine located in the part with which wireless zone 10A and wireless zone 10B lap, the wireless contact 3 has the problem of it being vacant and recognizing a frequency f1 and a slot 2 to be carriers.

[0013] In this case, although a means to manage the frequency and slot currently used with each wireless contact 2 and 3 is required, when transmitted power is weak, in order that the configuration of a cel may receive effect in a building etc. greatly like PHS, it is difficult to expect whether a lap occurs from the physical relationship of a wireless contact simply, and it difficult [it] to judge whether a certain frequency and slot are usable.

[0014] Next, the trouble in the case of it being vacant in a migration machine side, and searching a carrier is pointed out. In this case, it will be vacant in a migration machine side, a carrier will be searched, and it will be notified to a wireless contact. Moreover, it becomes to detect generating of asynchronous interference a migration machine side. And it will be known that asynchronous interference generated the wireless contact when the signal from a migration machine stopped. When it considers as such a configuration, there are the following troubles.

[0015] The 1st point is that a wireless contact needs to grasp all the migration machines that exist in their wireless zone first. The reason is that it detects asynchronous interference by saying that a wireless contact cannot receive the signal transmission from a mobile station which was able to receive until now.

[0016] The 2nd point is points that a wireless contact always needs to supervise the existence of the input signal of all migration machines. By this approach, when migration machines are a large number, the load of processing with a wireless contact will become large.

[0017] The 3rd point is being unable to determine which channel should be used, when a channel which is vacant from each migration machine and is different as a channel is notified, and asynchronous interference occurs.

[0018]

[Problem(s) to be Solved by the Invention] In the part which two wireless zones which consist of conventional asynchronous interference evasion approaches mentioned above with a different wireless contact overlap, there was a trouble that generating of asynchronous interference was nonavoidable.

[0019] The purpose of this invention is offering the asynchronous interference evasion approach generating of asynchronous interference generated in the part which two wireless zones constituted by different wireless contact overlap being avoidable.

[0020]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the migration communication system of this invention In the migration communication system which consists of child offices which are communicating by the communication mode using TDMA between two or more key stations and said key station The interference investigation signal for investigating whether in case it is going to use a certain channel, asynchronous interference occurs in the channel of the use schedule is sent out to the channel of said use schedule. When [which carried out count reception] the notice signal of interference which notifies the purport which asynchronous interference generates in the receiving slot corresponding to the sending-out slot of this interference investigation signal is received or an error packet is able to be defined beforehand The key station which judges with asynchronous interference having occurred and uses channels other than said use schedule channel, When [which carried out count detection] an error packet is able to be defined beforehand, it judges with asynchronous interference having occurred, and it is characterized by consisting of child offices which send out said notice signal of interference to said key station which has sent out said interference investigation signal.

[0021] If according to this invention the key station which is going to use a certain channel sends out an interference investigation signal before using the channel, in a child office, an error packet will occur with the interference investigation signal. Therefore, a child office can know that asynchronous interference will occur, if that key station uses this channel, and it sends out the notice signal of interference to the key station which is going to use a certain channel. Thereby, if the channel is used, the key station which is going to use a certain channel can know that asynchronous interference will occur, and other channels will be used for it.

[0022] Therefore, the migration communication system which can avoid generating of asynchronous interference which may be produced in the part to which each area to cover overlaps between two key stations which cannot receive a mutual signal is realizable with a simple configuration.

[0023] Moreover, other migration communication system of this invention is set to the migration communication system which consists of child offices which are communicating by the communication mode which used TDMA between two or more key stations and said key station. The interference investigation signal for investigating whether in case it is going to use a certain channel, asynchronous interference occurs in the channel of the use schedule is sent out to the

channel of said use schedule. When [which carried out count reception] the notice signal of interference which notifies the purport which asynchronous interference generates in the receiving slot corresponding to the sending-out slot of this interference investigation signal is received or an error packet is able to be defined beforehand The key station which judges with asynchronous interference having occurred and uses channels other than said use schedule channel, When the generating pattern of a key station of an error packet corresponds with the pattern which sends out said interference investigation signal, it judges with asynchronous interference having occurred, and it is characterized by consisting of child offices which send out said notice signal of interference to said key station which has sent out said interference investigation signal.

[0024] Moreover, the pattern with which a key station sends out said interference investigation signal may be the pattern which sends out an interference investigation signal for every fixed period, it may be the pattern which cannot send out an interference investigation signal for every fixed period, but sends out in the other period, and it may be the pattern from which the count which continues and transmits an interference investigation signal between the slots which do not transmit an interference investigation signal changes regularly. Furthermore, the pattern with which a key station sends out said interference investigation signal The count which may be the pattern from which the count which does not continue and transmit an interference investigation signal between the slots which transmit an interference investigation signal changes regularly, and sends out an interference investigation signal continuously, You may be the pattern from which the interference investigation signal just behind that is continuously sent out, and is twisted, and a count changes regularly, and may be the count which sends out an interference investigation signal continuously, and the pattern with which it continues, an interference investigation signal is sent out and twisted immediately after that, and a count becomes the same.

[0025] Since he is trying to judge with asynchronous interference having occurred when according to this invention a key station sends out an interference investigation signal by the pattern defined beforehand and the generating pattern of a child office of an error packet corresponds with the pattern, when the count error packet of fixed merely occurs only in succession, as compared with the case where it judges with asynchronous interference having occurred, the count sent out in an interference investigation signal can reduce.

[0026] Furthermore, you may make it said child office send out said notice signal of interference by the pattern set up beforehand. The pattern with which this child office sends out said notice signal of interference may be the pattern which sends out the notice signal of interference for every fixed period, and it may be the pattern which cannot send out the notice signal of interference for every fixed period, but sends out in the other period, and may be the pattern which changes regularly in the count which continues and transmits the notice signal of interference between the slots which do not transmit the notice signal of interference. Moreover, the pattern with which this child office sends out said notice signal of interference The count which may be the pattern from which the count which does not continue and transmit the notice signal of interference between the slots which transmit the notice signal of interference changes regularly, and sends out the notice signal of interference continuously, You may be the pattern from which the notice signal of interference just behind that is continuously sent out, and is twisted, and a count changes regularly, and may be the count which sends out the notice signal of interference continuously, and the pattern with which it continues, the notice signal of interference is sent out and twisted immediately after that, and a count becomes the same.

[0027] Since he is trying to judge with asynchronous interference having occurred when according to this invention a child office sends out the notice signal of interference by the pattern defined beforehand and the generating pattern of a key station of an error packet corresponds with the pattern, it can know certainly that asynchronous interference generated the key station which was going to use a certain channel and sent out the interference investigation signal.

[0028] Moreover, in other migration communication system of this invention, when an error packet is received in a receiving slot, said key station takes a synchronization to said notice

signal of interference, and may be made to perform processing which checks that the input signal is a notice signal of interference.

[0029] Since according to this invention it can be recognized as the key station which is going to use a certain channel being a notice signal of interference and the notice signal of interference from a child office can be received, it can prevent incorrect-recognizing it as having received the error packet generated according to a certain factor, and asynchronous interference having occurred.

[0030] Furthermore, you may make it said key station send out said interference investigation signal in other migration communication system of this invention to all the transmitting slots on the carrier with which the channel of a use schedule belongs.

[0031] Furthermore, you may make it judge with asynchronous interference having generated said key station, when the notice signal of interference is received in one which belongs on the carrier which has sent out the interference investigation signal of receiving slots or an error packet is received in other migration communication system of this invention.

[0032] Furthermore, said interference investigation signal may be a signal non-become irregular. According to this invention, since it is not necessary to newly define the notice signal of interference, it can investigate easily whether asynchronous interference has occurred.

[0033]

[Embodiment of the invention] Next, the gestalt of operation of this invention is explained to a detail with reference to a drawing.

[0034] (1st operation gestalt) Drawing 1 is the block diagram showing the configuration of the migration communication system which applies the asynchronous interference evasion approach of the 1st operation gestalt of this invention. Reference of drawing 1 constitutes this migration communication system from an assumed-parents office 113 and two or more child offices 110, 111, and 112. This migration communication system is the ad hoc network which can ****** on that spot, and is a system of the assumed-parents station mediation mold with which one set of the assumed-parents station 113 exists in one system. The internal structure of the assumed-parents station 113 and the child offices 110, 111, and 112 is the same, one set becomes an assumed-parents station out of two or more equipments which can also become an assumed-parents station or a child office, and other equipments serve as a child office.

[0035] the communication link between an assumed-parents station and a child office — this operation gestalt — the cordless handset of PHS — the carrier for a between direct message is used. TDMA-TDD (Time DivisionMultiple Access-Time Division Duplex) is used as an access method here, and a TDMA multiplex number is 4. In this migration communication system, one channel per ad hoc network is used. Although it does not carry out that an assumed-parents station takes other equipments and a synchronization but operates to the slot timing of the assumed-parents station itself, a child office takes a synchronization so that the transmitting slot of an assumed-parents station and the receiving slot of a child office may correspond, and so that the receiving slot of an assumed-parents station and the transmitting slot of a child office may correspond. In order for two or more child offices to share 1 of the slot for reception of the assumed-parents station 113 slot, it is necessary to perform collision control so that two or more child offices may not send out a packet to coincidence.

[0036] In this migration communication system, the ICMA-PE (Idle-signal Casting Multiple Access with Partial Echo) technique is used as the control approach of such a collision. In ICMA-PE, it gets down for collision control and the direction packet (it is hereafter called the direction packet for collision control of going down) is always sent out to the child office using the transmitting slot.

[0037] The child office 110 explains the actuation which takes a synchronization with reference to drawing 2 between the assumed-parents offices 113. In drawing 2, the direction packets 2001, 2002, and 2003 for collision control of going down and .. are periodically transmitted from the assumed-parents office 113, and the child office 110 can take the synchronization between the assumed-parents offices 113 by receiving these direction packets 2001, 2002, and 2003 for collision control of going down, and ..

[0038] Moreover, the configuration of these direction packets 2001, 2002, and 2003 for collision

control of going down and _ is shown in drawing 3. According to drawing 3, the direction packets 2001, 2002, and 2003 for collision control of going down and _ consist of unique WORD 301, the going-down information signal 302, the free line / prohibition bit 303, reception / non-receiving bit 304, the partial echo field 305, and the error detection field 306.

[0039] Unique WORD 301 is the field for taking a synchronization, and is a certain decided bit pattern. It gets down and an information signal 302 is data transmitted from an assumed-parents station to a child office. A free line / prohibition bit 303 is used for displaying "prohibition" and forbidding access from other child offices when data are being received from a certain child office. Reception / non-receiving bit 304 displays "reception", when a signal without an error is received correctly, and when neither the case where there is an error which cannot be corrected, nor the signal is received, it indicates "un-receiving." When it indicates "un-receiving" during signal transmission, the child office under data packet transmission halts transmit information, and goes into a resending procedure. It uses for judging whether the partial echo field 305 displays some received data, a child office collates it with this information, and the information which the local station sent is received correctly. It uses for whether the error detection field 306 has an error in the packet which received, and it checking. when judged with investigating [whether when building an ad hoc network, it is vacant in an available channel and there is any channel, and] an assumed-parents station according to a certain procedure, and it being vacant and coming out of it, the packet for collision control is continuously sent out using the channel.

[0040] Next, the configuration of the assumed-parents office in the 1st operation gestalt of this invention and a child office is shown in drawing 4. Reference of drawing 4 constitutes this equipment from the RF section 401, the clock generation section 402, the antenna section 403, the TDMA-TDD processing section 404, the ad hoc protocol processing section 405, the channel control section 406, the count storage section 407 of interference investigation packet sending out, the packet receiving result storage section 408, an interference detecting element 409, and a high order layer 410.

[0041] The RF section 401 performs transmission and reception of an electric wave, a modulation, and a recovery. The clock section 402 generates a periodic clock signal, and supplies the generated clock signal to the RF section 401 and the TDMA-TDD processing section 404. The antenna section 403 transmits and receives an electric wave. The TDMA-TDD processing section 404 performs processing about TDMA-TDD. The function to receive the data of the channel specified by the ad hoc protocol processing section 405, and to pass it to the ad hoc protocol processing section 405. The function to transmit the data specified from the ad hoc protocol processing section 405 to the channel specified using the RF section 401. The function to investigate the received field strength of the channel specified by the ad hoc protocol processing section 405. The function notified to the ad hoc protocol processing section 405 when receiving data by the specified channel and unique WORD is not able to be detected. And when data are received by the specified channel and a CRC error is detected, it has the function notified to the ad hoc protocol processing section 405.

[0042] The ad hoc protocol processing section 405 has the function which transmits and receives a control signal through the TDMA-TDD processing section 404, and the function which transmit and receive the data about the high order layer 410 through the TDMA-TDD processing section 404, in order to play the role which builds and maintains an ad hoc network. The channel control section 406 has the function to determine the channel used by investigating the opening of a channel, and this functions at the time of ad hoc network construction and interference generating.

[0043] The count storage section 407 of interference investigation packet sending out memorizes the count of sending out of the interference investigation signal which is a signal sent out in order to investigate whether asynchronous interference occurs in the channel of a use schedule.

[0044] The packet receiving result storage section 408 memorizes the receiving result (normal reception -CRC error unique WORD un-detecting / decode impossible signal) in the slot which received only the predetermined slot from the slot under current reception at the past period.

The interference detecting element 409 judges whether based on whether the error packet more than a predetermined number (packets other than normal reception) is in the receiving result of the past period, asynchronous interference has generated only the predetermined slot from the slot under current reception memorized by the packet receiving result storage section 408. The high order layer 410 is application which transmits and receives data using an ad hoc protocol.

[0045] Next, actuation of the asynchronous interference evasion approach of this operation gestalt is explained to a detail with reference to a drawing.

[0046] Actuation in case the assumed-parents office 501 is holding the ad hoc network 504 using a channel ch1 as shown in drawing 5, and the assumed-parents office 502 is going to hold the ad hoc network 505 using a channel ch1 under the situation that the child office 503 has participated in this ad hoc network 504 is explained using drawing 4 - drawing 9.

[0047] Actuation of the child office 503 in the migration communication system of this operation gestalt is shown in the flow chart of drawing 6, and actuation of the assumed-parents office 502 is shown in the flow chart of drawing 7.

[0048] First, although the direction packet for collision control of going down is always transmitted using the transmitting slot of a channel ch1, a condition 501, i.e., an assumed-parents office, before the assumed-parents office 502 holds the ad hoc network 505, the assumed-parents office 502 explains the actuation about reception of the child office 503 in the condition that nothing has transmitted, using the flow chart of drawing 6. In such a case, as shown in drawing 8, the assumed-parents office 501 has transmitted periodically the direction packets 2001 and 2002 for collision control of going down, and .., and the child office 503 received these direction packets 2001 and 2002 for collision control of going down, and .., and has taken the synchronization between the assumed-parents offices 501.

[0049] Here, by the communication link between the assumed-parents station 501 and the child office 503, an error packet is not generated, but detection of unique WORD is successful, a CRC error is not detected, but it is explained, assuming the signal which the child office 503 received to be what is a signal decipherable [with the ad hoc protocol processing section 405].

[0050] Moreover, in subsequent explanation, the number of the slots which memorize the receiving result is set to N, the interference detecting element 409 sets to n1 the number of the criteria judged as asynchronous interference having occurred with the number of the error packets in a past N packet, and the packet receiving result storage section 408 sets to n2 the maximum number which sends out an interference investigation packet continuously with directions of the channel control section 406. Moreover, in the communication link between the assumed-parents station 501 and the child office 503, when the number of the error packets of a past N packet has occurred n 3 times or more, since the CHANE does not fulfill criteria communication link quality, processing which changes a channel is performed. In this case, the child office 503 sends out the channel change demand signal which notifies the purport which changes a channel to the assumed-parents station under current communication link.

[0051] In addition, N, n1, n2, and n3 are positive integer values, and they are the value of which N>n3>n2>n1 consists. For example, they are N= 240, n3=120, n2=110, and a value, such as n1=100.

[0052] First, the child office 503 receives the signal on the carrier with which a channel ch1 belongs by the RF section 401, and passes it to the TDMA-TDD processing section 404 (step 601). The TDMA-TDD processing section 404 takes out the signal of the slot of a channel ch1 from the received signal (step 602), and it judges whether unique WORD is detected (step 603). Here, if unique WORD is detected, it will be accumulated, and it is investigated whether next a CRC error is detected (step 604). Here, since a CRC error is not detected, the received signal is passed to the ad hoc protocol processing section 405 (step 605). It judges whether the ad hoc protocol processing section 405 can decode the signal (step 606), and since it is decipherable here, having received normally in the packet receiving result storage section 408 is recorded (step 607). Next, since the signal which the received signal received here although the judgment of being an interference investigation packet was performed (step 608) is the direction packet for collision control of going down, the received signal is processed in the ad hoc protocol processing section 405 (step 609).

[0053] Next, the interference detecting element 409 investigates the receiving result of a past N packet, and it is judged whether the number of error packets (unique WORD packet which is not detected [a CRC error or]) is more than n3 (step 610). Here, since the error packet is not generated, the number of error packets becomes less than [n3], and it is judged whether next the number of error packets (unique WORD packet which is not detected [a CRC error or]) is more than n1 (step 611). Here, since the number of error packets is less than [n1], special processing is not performed but the following signal is received.

[0054] Next, actuation of the assumed-parents office 502 in case the assumed-parents office 502 is going to hold the ad hoc network using a channel ch1 is explained using the flow chart of drawing 7.

[0055] Here, as shown in drawing 5, since the assumed-parents office 505 is located in the outside of the ad hoc network 504, it shall be below a threshold (it sets with =E) judge that this channel is being used for the received field strength in the transmitting slot and receiving slot of the channel ch1 measured in the assumed-parents office 502. First, in order that the assumed-parents station 502 may hold an ad hoc network, ch1 is vacant and it investigates whether it is a channel. Specifically, the assumed-parents station 502 supervises [whether the field strength beyond the four continuation threshold E is detected, and] the transmitting-side slot of a channel ch1 first using the TDMA-TDD processing section 404 (step 701). In this case, the field strength beyond a threshold E is not detected from an assumption (step 702). Next, it supervises whether in a receiving-side slot, the field strength beyond the four continuation threshold E is detected similarly (step 703). Similarly in this case it is not detected (step 704). Then, the assumed-parents station 502 sets to 0 the value memorized by the count storage section 407 of interference investigation packet sending out (step 705). And an interference investigation packet is transmitted (step 706). 1 is added to the count currently recorded on the count storage section 407 of interference investigation packet sending out, and the value is stored in the count storage section 407 of interference investigation packet sending out (step 707). And it investigates whether the notice packet of interference or an error packet is received in the receiving slot immediately after transmitting an interference investigation packet (step 708). When the notice packet of interference or an error packet is not received, it judges whether the value stored in the count storage section 407 of interference investigation packet sending out is more than n2 (step 709). When the value is not more than n2, an interference investigation packet is again transmitted in the following transmitting slot (step 706).

[0056] When judged with the value stored in the count storage section 407 of interference investigation packet sending out in step 709 being more than n2, the slot which sent out the interference investigation signal does not occur, but judges that asynchronous interference is usable (step 710). It means that it was here judged with a transmitting-side slot being usable.

[0057] Next, it investigates whether it checked that the slot of both a transmitting side and a receiving side was usable (step 712). Here, since it is not checking that only a transmitting-side slot is usable, the transceiver timing of the assumed-parents station 502 is shifted a semicircle term (step 713), and it investigates shortly whether a receiving-side slot is also usable by the approach investigated by the transmitting side, and the same approach. When it judges that a receiving-side slot is usable similarly, it judges with the channel being usable (step 714).

[0058] Here, actuation of the child office 503 when an interference investigation signal is transmitted is explained using drawing 6 from the assumed-parents office 502. Since the device in which a synchronization is taken between the assumed-parents station 501 and the assumed-parents station 502 does not exist, one of the following three cases produces the child office 503 in this case.

[0059] (1) The case where the assumed-parents station 501 has transmitted [the interference investigation signal from the assumed-parents station 502] no signals also in accordance with the receiving timing and chance of the child office 503 first. Although a child office is received as an interference investigation signal in this case, since the assumed-parents station 501 has usually sent out the direction packet for collision control of going down, this is actually a rare case.

[0060] (2) Next, the case in which (2) assumed-parents station 501 has sent out a certain signal

when the interference investigation signal from the assumed-parents station 502 is not in agreement with the receiving timing of the child office 503, and the interference investigation signal from the unique WORD part and the assumed-parents station 502 of the signal did not collide. In this case, the child office 503 will detect a CRC error.

[0061] (3) Moreover, the assumed-parents station 501 when the interference investigation signal from the assumed-parents station 502 is not in agreement with the receiving timing of the child office 503 and the assumed-parents station 501 has sent out no signals is the case in which the interference investigation signal from the unique WORD part and the assumed-parents station 502 of the signal collided although the signal was sent out. In this case, the child office 503 is unique WORD un-detecting.

[0062] Unless a packet loss will be carried out the middle if the assumed-parents office 502 transmits 1 9001-900n of continuation n1 time interference investigation signals as shown in drawing 8, the case of above (1), (2), and (3) is generated continuously once [sum total n]. Actuation of the child office 503 at that time is explained using the flow chart of drawing 6.

[0063] First, the case where (1) occurs even once among n1 times is explained. In this case, the signal of the carrier specified in the RF section 401 is received, and the TDMA-TDD processing section 404 is passed (step 601). Next, the signal of the decided slot is taken out in the TDMA-TDD processing section 404 (step 602). As a result of taking out, it investigates whether unique WORD has a CRC error next at that which is detected (step 603) (step 604). In this case, an input signal is passed to the ad hoc protocol processing section 405 noting that a CRC error is not detected (step 605). It judges whether the ad hoc protocol processing section 405 can decode the received signal (step 606). In this case, since it is decipherable, it records having carried out normal reception on the packet receiving result storage section 408 (step 607). Next, the packet which received judges whether it is an interference investigation signal (step 608). In this case, since the packet which received is an interference investigation signal, it judges with asynchronous interference having generated the interference detecting element 409, and the notice signal of interference is transmitted through the ad hoc protocol processing section 405 and the TDMA-TDD processing section 404 (step 618).

[0064] Next, when the case of (2) or (3) is generated, actuation of the child office 503 of an about is explained. In this case, it is the same as that of the case of (1) until it checks unique WORD. Next, since actuation differs by the case where the case where the case of (2) is generated, and the case of (3) are generated, it explains to according to in front of step 610, respectively.

[0065] Since unique WORD cannot be detected when the case of (3) is generated (step 603), it notifies that the TDMA-TDD processing section 404 received the unique WORD non-detected packet to the ad hoc protocol processing section 405 (step 612). Then, it records that the ad hoc protocol processing section 405 received the unique WORD non-detected packet in the packet receiving result storage section 408 (step 613).

[0066] Next, the case where the case of (2) is generated is explained. In this case, since unique WORD is detected (step 603), it judges whether next the CRC error has occurred (step 604). In this case, since a CRC error is detected, it notifies that the TDMA-TDD processing section 404 received the packet of a CRC error to the ad hoc protocol processing section 405 (step 614). Then, it records that the ad hoc protocol processing section 405 received the packet of a CRC error in the packet receiving result storage section 408 (step 615).

[0067] Henceforth, the case of the case of (2) and (3) is explained collectively again. Next, the interference detecting element 409 investigates the receiving situation of a past N packet with reference to the packet receiving result storage section 408. When the error (unique WORD un-detecting and CRC error / decode impossible) packet has occurred n 3 times or more in a past N packet, delivery sending out of the channel change demand signal is carried out at the TDMA-TDD processing section 404 (step 617). Here, since the number of error packets is n1 time, a channel change demand signal is not sent out. Next, it is judged whether the number of the error packets in a past N packet is more than n1 time (step 611). Here, since the number of the error packets memorized by the packet receiving result storage section 408 is n1, it judges with asynchronous interference having generated the interference detecting element 409, and as

shown in drawing 9 , the notice signal 910 of interference is transmitted through the ad hoc protocol processing section 405 and the TDMA-TDD processing section 404 (step 618).
[0068] As explained above, the notice signal of interference is transmitted from the child office 503 about all the cases of (1), (2), and (3), respectively. Next, actuation of the assumed-parents office 502 after the notice signal of interference was sent out from the child office 503 is explained using the flow chart of drawing 7 .
[0069] In this case, the assumed-parents station 502 is whether the notice signal of interference transmitted from the child office 503 is received as a notice signal of interference, or to receive as an error packet. When the synchronization of the assumed-parents office 502 and the child office 503 can be taken by chance, the assumed-parents office 502 can recognize the notice signal of interference from the child office 503 to be a notice signal of interference, and can be received. However, when the synchronization of the assumed-parents office 502 and the child office 503 cannot be taken, as shown in drawing 9 , the assumed-parents office 502 cannot recognize the notice signal 910 of interference from the child office 503 to be a notice signal of interference, but receives it as an error packet.
[0070] If the notice signal of interference or one signal of the error packets is received (step 708), the assumed-parents station 502 will judge with asynchronous interference having occurred, and will judge the channel that use is impossible (step 711).
[0071] In addition, even if the assumed-parents office which is effective and has not sent out the interference investigation signal like the assumed-parents office 501 of drawing 5 receives the notice signal of interference only to the assumed-parents office 502 which has transmitted the interference investigation signal, processing of what is not performed, either and it is, and the notice signal of interference is **. Moreover, the assumed-parents station 502 carries out maximum n2 (110) time sending out of the interference investigation packet. Although this value is a larger count than n1 (100) which is a threshold for the child office 503 to send out the notice packet of interference, this is for securing the robustness over the interference investigation packet which the assumed-parents station 502 sends out losing. Furthermore, when the assumed-parents office 502 receives the notice signal of interference which the child office 503 transmitted as a packet of a CRC error Also when it is not based on the notice signal of interference and generates by other factors by chance, it takes into consideration, a ****** [that asynchronous interference has occurred after making it judge with it being unusable or repeating the interference investigation by the asynchronous interference evasion approach in this operation gestalt two or more times, when continuation n5 (1<n5<n3-n2) time reception is carried out in the sense of a check] — judging — you may make .
[0072] For example, it will be set to n5=n3-n2=120-110=10 if the concrete number in this operation gestalt is applied. That is, n5 becomes between 1 to 9 in this case. Thus, it is because the child office 503 will receive an error packet 120 times or more continuously and sends out a channel change signal to the assumed-parents station 501, when having specified the upper limit makes n5 10 times or more.
[0073] As explained above, according to the migration communication system of this operation gestalt, and the asynchronous interference evasion approach, generating of asynchronous interference which may be produced in the assumed-parents office 501 which cannot receive a mutual signal, and the part to which each area to cover overlaps among 502 is avoided, and it becomes possible to realize without moreover using a complicated controlling mechanism.
[0074] The reason is as follows. First, before an assumed-parents station uses a channel, multiple-times sending out of the interference investigation packet is carried out. Then, asynchronous interference occurs in the duplication part of area by it. If asynchronous interference occurs, the child office which exists there will notify that to the assumed-parents station which is going to use the channel for generating of asynchronous interference with the notice signal of interference. Then, the assumed-parents station which is going to use a channel makes the notice signal of interference the notice signal of interference, or it receives as an error packet. It can know that asynchronous interference has generated by this the assumed-parents office which is going to use a channel. Thus, since generating of asynchronous interference detects [the notice from a child office] by the asynchronous interference evasion

approach of this operation gestalt, complicated control which grasps all the child offices where an assumed-parents station exists in area, and supervises each child office is unnecessary.
[0075] (2nd operation gestalt) Next, the migration communication system of the 2nd operation gestalt of this invention and the asynchronous interference evasion approach are explained.
[0076] The configuration of the assumed-parents office in the migration communication system of this operation gestalt and a child office is shown in drawing 10 . To the configuration which showed the assumed-parents office and child office in this operation gestalt to drawing 4 , the interference detecting element 409 and the channel control section 406 replace the interference detecting element 1009 and the channel control section 1006, respectively, the count storage section 407 of interference investigation packet sending out is deleted, and the interference investigation signal sending-out pattern storage section 1007 is newly added.
[0077] The interference investigation signal sending-out pattern storage section 1007 has memorized the sending-out pattern of an interference investigation signal. The concrete example of the sending-out pattern of the interference investigation signal memorized by this interference investigation signal sending-out pattern storage section 1007 is shown in drawing 11 .
[0078] This sending-out pattern For example, a pattern which sends out an interference investigation signal every (1) fixed period (drawing 11 R> 1 (a)), Or an interference investigation signal cannot be sent out every fixed period, but the pattern (drawing 11 (b)) and (2) interference investigation signals of sending out are sent out in the other period (or), an interference investigation signal is sent out and there is nothing — a pattern (drawing 11 (c) —) to which spacing is made to increase in proportion to time amount The count which sends out a drawing 11 (d) (3) interference investigation signal, and a pattern to which an interference investigation signal is sent out and twisted and a count is made to increase in proportion to time amount (drawing 11 (e)), (4) The count which the interference investigation signal sent out, and the interference investigation signal just behind that are sent out and twisted, a count is made the same, and the count which sends out an interference investigation signal can consider a pattern, such as a pattern (drawing 11 (f)) which is changed at random. As long as this sending-out pattern is a pattern beforehand defined besides the above, it may be what kind of pattern.

 [0079] The interference detecting element 1009 in this operation gestalt sends out the notice signal of interference, when in agreement with the sending-out pattern with which the generating pattern of an error packet is memorized by the interference investigation signal sending-out pattern storage section 1007. Moreover, the channel control section 1006 in this operation gestalt sends it out with the sending-out pattern memorized by the interference investigation signal sending-out pattern storage section 1007 rather than sends out an interference investigation signal continuously.
[0080] Next, actuation of the migration communication system of this operation gestalt is explained.
[0081] With this operation gestalt, in case an interference investigation signal is sent out before the assumed-parents station 502 uses a channel, there is nothing then and it is sent out according to the pattern which is sent out continuously and which is memorized by the interference investigation signal sending-out pattern storage section 1007. As for this pattern, it is desirable for the pattern which an error packet may generate in the actual field to be a completely different pattern.
[0082] Next, actuation in case a child office sends out the notice packet of interference is explained. The interference detecting element 1009 of the child office 503 is serially collated with the receiving result memorized by the packet receiving result storage section 408 and the sending-out pattern memorized by the interference investigation signal sending-out pattern storage section 1007. Since it can judge with what asynchronous interference has generated immediately when an interference investigation packet is received, the child office 503 sends out the notice signal of interference immediately. In such a case, the interference detecting element 1009 sends out the notice signal of interference to except, when in agreement with the sending-out pattern with which the generating pattern of an error packet is memorized by the interference investigation signal sending-out pattern storage section 1007. The assumed-parents

station 502 which is going to use the channel ch1 supervises whether the notice signal of interference or an error packet is received, after sending out the pattern memorized by the interference investigation signal sending-out pattern storage section 1007. When the notice packet of interference is received at this time or an error packet is received, the assumed-parents office 502 which is going to use the channel ch1 can know generating of asynchronous interference. In this case, in order to secure certainty, as a result of repeating this pattern several times, you may judge.

[0083] This operation gestalt can reduce the count which sends out an interference investigation signal by using the pattern which is hard to generate in the actual field as a sending-out pattern of an interference investigation signal.

[0084] (3rd operation gestalt) Next, the migration communication system of the 3rd operation gestalt of this invention and the asynchronous interference evasion approach are explained.

[0085] The configuration of the migration communication system of this operation gestalt is the same as the configuration shown in drawing 4 , and when the synchronization cannot be taken between the assumed-parents office 502 and the child office 503, performing processing which shifts receiving timing so that the assumed-parents office 502 may take the synchronization with the notice signal of interference sent out from the child office 503 only differ.

[0086] The actuation in the migration communication system of this operation gestalt is shown in drawing 12 . To the midst to which the assumed-parents station 502 which is going to use a channel with this operation gestalt has sent out the interference investigation signals 9001 and 9002 and _ When an error packet (error packet by the notice signal 9101 of interference) is received in a receiving slot, the assumed-parents station 502 which is going to use the channel ch1 It stops sending out an interference investigation signal, and it tries so that a synchronization may be taken to these notice signals 9101, 9102, and 9103 of interference, and _ As a result of a synchronization being able to take and receiving, when it is a notice signal of interference (notice signal 9103 of interference), it is recognized as interference having occurred and use of the channel is suspended. When it is impossible to take a synchronization, it judges whether it tries repeatedly several times and the channel ch1 is used.

[0087] In addition, only sufficient count needs to send out the notice signal of interference so that the assumed-parents office 502 which is going to use the channel may stop sending out of the interference investigation signals 9001 and 9002 and _ and the child office 503 which detected asynchronous interference in this case can take a synchronization to the notice signals 9101, 9102, and 9103 of interference, and _

[0088] Since according to this operation gestalt it can be recognized as the assumed-parents office 502 which is going to use the channel ch1 being a notice signal of interference and the notice signal of interference from the child office 503 can be received, it can prevent incorrect-recognizing it as having received the error packet generated according to a certain factor, and asynchronous interference having occurred.

[0089] (4th operation gestalt) Next, the migration communication system of the 4th operation gestalt of this invention and the asynchronous interference evasion approach are explained. The configuration of the assumed-parents office in the migration communication system of this operation gestalt and a child office is shown in drawing 13 . To the configuration which showed the assumed-parents office and child office in this operation gestalt to drawing 4 , the interference detecting element 409 and the channel control section 406 replace the interference detecting element 1209 and the channel control section 1206, respectively, and the notice signal sending-out pattern storage section 1211 of interference is newly added.

[0090] The notice signal sending-out pattern storage section 1211 of interference memorizes the pattern which sends out the notice signal of interference. As a concrete example of the sending-out pattern of the notice signal of interference memorized by this notice signal sending-out pattern storage section 1211 of interference, a pattern as shown in drawing 1111 can be used.

[0091] That is, the sending-out pattern memorized by the notice signal sending-out pattern storage section 1211 of interference For example, a pattern which sends out the notice signal of interference every (1) fixed period (drawing 11 (a)), Or the notice signal of interference cannot

be sent out every fixed period, but the pattern (drawing 11 (b)) and the notice signal of (2) interference of sending out are sent out in the other period (or), the notice signal of interference is sent out and there is nothing — a pattern (drawing 11 (c) —) to which spacing is made to increase in proportion to time amount The count which sends out the notice signal of drawing 11 FD1(d)(3) interference, and a pattern to which the notice signal of interference is sent out and twisted and a count is made to increase in proportion to time amount (drawing 11 (e)), (4) The count which the notice signal of interference sent out, and the notice signal of interference just behind that are sent out and twisted, a count is made the same, and the count which sends out the notice signal of interference can consider a pattern, such as a pattern (drawing 11 (f)) which is changed at random. As long as this sending-out pattern is a pattern beforehand defined besides the above, it may be what kind of pattern.

[0092] When asynchronous interference is detected, the interference detecting element 1209 in this operation gestalt continues the notice signal of interference, and does not send it out, but it sends out the notice signal of interference based on the sending-out pattern memorized by the notice signal sending-out pattern storage section 1211 of interference. Moreover, the error packet is a notice signal of interference, and the channel control section 1206 in this operation gestalt judges with asynchronous interference having occurred, when the pattern of the error packet which received is in agreement with the sending-out pattern memorized by the notice signal sending-out pattern storage section 1211 of interference.

[0093] Next, actuation of the migration communication system of this operation gestalt is explained.

[0094] With this operation gestalt, in case the child office 503 sends out the notice signal of interference, it sends out the notice signal of interference based on the sending-out pattern currently recorded on the notice signal sending-out pattern storage section 1211 of interference rather than sends out the notice signal of interference continuously.

[0095] As for this pattern, it is desirable for the pattern which an error packet may generate in the actual field to be a completely different pattern.

[0096] And when the pattern with which the assumed-parents office 502 which has sent out the interference investigation signal receives an error packet, and receives the error packet is the same as the pattern currently recorded on the notice signal sending-out pattern storage section 1211 of interference, it recognizes as asynchronous interference having generated the assumed-parents office 502 which has sent out the interference investigation signal, and judges that the channel ch1 cannot be used.

[0097] Thus, it can know that asynchronous interference has generated more certainly the assumed-parents office 502 which has sent out the interference investigation signal by sending out the notice signal of interference with the pattern which is recorded on the notice signal sending-out pattern storage section 1211 of interference and which was defined beforehand.

[0098] (5th operation gestalt) Next, the migration communication system of the 5th operation gestalt of this invention and the asynchronous interference evasion approach are explained.

[0099] The fundamental configuration of the migration communication system of this operation gestalt is the same as the configuration shown in drawing 4 , and only a part of the actuation differs.

[0100] With this operation gestalt, when it is going to use the slot of a carrier with the assumed-parents station 502, an interference investigation signal is not sent out only to the slot of the carrier, but an interference investigation signal is sent out to all the transmitting slots on a carrier. Similarly, reception actuation of the notice signal of interference does not perform only the slot which is going to use a certain carrier, either, but is performed about all the receiving slots on the carrier. It not only avoids generating of asynchronous interference generated when two or more assumed-parents offices use the same slot, but according to this operation gestalt, it is avoidable to use the same carrier. And if a different carrier between different assumed-parents stations is used, naturally asynchronous interference will not be generated.

[0101] By the asynchronous interference evasion approach by this operation gestalt, trying not to be used by the assumed-parents station from which two slots on one carrier differ as mentioned above is based on the following reasons.

[0102] If it checks that asynchronous interference has not occurred in case it is originally going to use a certain slot, even if a different assumed-parents station uses two slots on one carrier, the problem by asynchronous interference should not be generated. However, asynchronous interference which the clock signal which serves as criteria with time amount progress shifted, and had not been generated at the beginning-of-using time may occur with time amount progress according to the difference of the precision of Xtal built in an assumed-parents office.
[0103] Therefore, if it is made not to be used by the assumed-parents office where two slots on one carrier differ, asynchronous interference generated with time amount progress is also completely avoidable.
[0104] However, although generating of asynchronous interference is avoidable if it avoids that two or more slots are used on the carrier same in this way Since circuit capacity falls, when the circuit is vacant in fact When the slot used by each assumed-parents station by the asynchronous interference evasion approach of this operation gestalt was made to be distributed by each carrier and a circuit is crowded After checking that asynchronous interference does not occur per slot using the asynchronous interference evasion approach by other operation gestalten, two or more slots on one carrier will be used.
[0105] (6th operation gestalt) Next, the migration communication system of the 6th operation gestalt of this invention and the asynchronous interference evasion approach are explained.
[0106] Although the fundamental configuration of the migration communication system of this operation gestalt is the same as the configuration shown in drawing 4 , the point that it can direct to send out a signal from the ad hoc protocol processing section 405 in no becoming irregular to the TDMA-TDD processing section 404 differs from the point that it can be directed that the TDMA-TDD processing section 404 sends out a signal in no becoming irregular to the RF section 401.
[0107] Next, actuation of the migration communication system of this operation gestalt is explained. Although actuation of the migration communication system of this operation gestalt is fundamentally the same as the 5th operation gestalt, a certain signal is sent out in no becoming irregular instead of sending out an interference investigation signal. The signal sent out here does not need to be an interference investigation signal. The effectiveness of this operation gestalt is the point that interference investigation is easily realizable, by conducting interference investigation at the point that it is not necessary to newly define the notice signal of interference, by the approach of only not performing the place originally modulated.
[0108] (7th operation gestalt) Next, the migration communication system of the 7th operation gestalt of this invention and the asynchronous interference evasion approach are explained.
[0109] Although the fundamental configuration of the migration communication system of this operation gestalt is the same as the configuration shown in drawing 4 , the point that the transmitted power of a signal can be directed from the ad hoc protocol processing section 405 to the TDMA-TDD processing section 404 differs from the point that the transmitted power of a signal can be directed from TDMA-TDD404 to the RF section 401.
[0110] Next, actuation of the migration communication system of this operation gestalt is explained. With this operation gestalt, weak transmitted power sends out an interference investigation signal at first. And gradually, if the notice signal of interference from a child office is not detected, transmitted power is repeatedly investigated until it finally results in the maximum transmitted power which can be sent out with slight strength. If the notice signal of interference from a child office is not detected even if it sends out an interference investigation signal with the maximum transmitted power, it judges with the ability of the slot to be used. Although there s a problem that interference occurs in a child office and the communication link of a child office becomes impossible when an assumed-parents office sends out an interference investigation signal, with this operation gestalt, it is effective in it being [the number of the child offices which interference generates] minimum-hard, and being able to stop it by extending gradually the range at which the notice signal of interference arrives.
0111] Although the 7th operation gestalt explained using the migration communication system which used the ad hoc protocol with which the assumed-parents station and the child office have the same composition as migration communication system from the above 1st This

invention is not limited to this, and even when the usual migration communication system which consists of a migration machine which is a child office as shown in drawing 14 , and a wireless contact which is a key station is used, it can be applied similarly.
[0112]
[Effect of the Invention] As explained above, according to this invention, the effectiveness that generating of asynchronous interference generated in the part which two wireless zones constituted by different key station overlap is avoidable can be acquired.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention] This invention relates to the asynchronous interference evasion approach for avoiding generating of asynchronous interference used especially in this migration communication system about the migration communication system which consists of child offices which are communicating by the communication mode which used time-division multiplexing (TDMA:TimeDivision Multiple Access) between two or more key stations and this key station.

[Translation done.]

PRIOR ART

[Description of the Prior Art] In recent years, since migration communication system, such as a cellular phone, is spreading rapidly, the TDMA method which carries out time sharing of the same frequency circuit for the purpose of increasing the circuit capacity in the limited frequency band, and is used by two or more circuits is adopted in much migration communication system.
[0003] According to this TDMA method, the frequency more nearly same than two or more systems can be used without making an alien system generate interference, and it can communicate.
[0004] However, between the systems which are communicating using the same frequency, when a system clock frequency shifts with time amount progress, interference will occur between two systems. Such interference is called asynchronous interference. In the migration communication system which has adopted the TDMA method, since it is necessary to avoid generating of such asynchronous interference, the various asynchronous interference evasion approaches for avoiding generating of this asynchronous interference are proposed.
[0005] One of the conventional asynchronous interference evasion approaches is proposed by JP,7-87169,A. First, the configuration of the migration communication system with which this asynchronous interference evasion approach is used is shown in drawing 14. This migration communication system consists of a wireless communication control unit 1, wireless contacts 2-5, and migration machines 6-9.
[0006] Wireless line equipment 1 is performing exchange control with a common public network or other migration communication system, and the wireless circuit in a system, migration management of a migration machine, and wireless management of a system. The wireless contacts 2-5 are supervising the radio channel while performing setup and release of a wireless circuit with the migration machines 6-9 to the bottom of management of the wireless communication control unit 1. The migration machines 6-9 are communicating through the wireless contacts 2-5 and the wireless communication control unit 1, moving in the inside of a system. Moreover, to the wireless contacts 2, 3, 4, and 5, the wireless zones 10A, 10B, 10C, and 10D are set up, respectively.
[0007] Next, the configuration of the wireless contacts 2-5 in drawing 14 is shown in drawing 15. The wireless contacts 2-5 consist of the antenna section 101, the wireless section 102, the modem section 103, frame generation / decomposition section 104, the control channel control section 105, the communication channel control section 106, an asynchronous interference detecting element 107, the interface section 108, and a slot synchronizer 109, respectively.
[0008] The antenna section 101 is transmitting and receiving the radio signal between migration machines. The wireless section 102 is performing conversion with the radio signal transmitted and received in the antenna section 101, and the signal which are outputted and inputted from the modem section 103. The modem section 103 is performing the strange recovery to the signal outputted and inputted from the wireless section 102. Frame generation / decomposition section 104 is performing generation/decomposition of a frame while performing generation/decomposition of a TDMA signal to the baseband signaling outputted and inputted from the modem section 103. The control channel control section 105 is performing control about a control channel. The communication channel control section 106 is performing control

about a communication channel. The asynchronous interference detecting element 107 performs the monitor of a radio channel, and is detecting the asynchronous interference wave. The interface section 108 is exchanging the data between the wireless communication control unit 1 and the wireless contacts 2–5. The slot synchronizer 109 extracts a slot synchronizing signal from the signal received in the interface section 108, and is controlling the slot timing of frame generation / decomposition section 104. The interface section 108 only replaces the configuration of the migration machines 6–9 with the interface section to a headset, and others including the asynchronous interference detecting element 107 are almost the same as the wireless contacts 2–5.

[0009] Next, they are explained using drawing 16 about actuation of the migration communication system which adopted this conventional asynchronous interference evasion approach, using the migration machine 6 and the wireless contact 2 as an example. Here, the migration machine 6 and the wireless contact 2 carry out to it being under communication link using the slot 2 of a frequency f1. The slot for reserve channels (in this case, slot 4) which is not usually used is prepared for the wireless contact 2, and the empty carrier is searched using that slot. The information about this empty carrier carries and is vacant into the slot 2 under communication link, and is notified to the migration machine 6 as a notice of carrier information (in this case, a frequency f2, a slot 4). When an empty carrier becomes unusable, a new empty channel is searched, updated and notified.

[0010] The wireless contact 2 measures the receiving level of two or more points of a slot during a communication link in the asynchronous interference detecting element 107, and reports the result to the communication channel control section 106 in the meantime. When the communication channel control section 106 performs asynchronous interference detection in connection with this measurement result and asynchronous interference is detected, it changes to the communication channel (a frequency f2, slot 4) notified as empty carrier information.

[0011] The migration machine 6 detects that the signal transmission which has received until now cannot receive, and changes it to the communication channel (a frequency f2, slot 4) notified beforehand. Consequently, a communication channel change is performed without using the communication channel which received interference, and cutting of a wireless circuit can be prevented. In addition, the asynchronous interference detecting element 107 can be formed in the migration machine 6 side, and can also be operated similarly.

[0012] However, there are the following technical problems in the conventional asynchronous interference evasion approach. First, the trouble in the case of it being vacant in a wireless contact side, and searching a carrier is pointed out. In this case, the empty carrier which comes out is an empty carrier in the installation of a wireless contact. Therefore, when the wireless contact 2 is using the frequency f1 and the slot 2, for example in drawing 14 , although a frequency f1 and a slot 2 are not empty carriers for the migration machine located in the part with which wireless zone 10A and wireless zone 10B lap, the wireless contact 3 has the problem of it being vacant and recognizing a frequency f1 and a slot 2 to be carriers.

[0013] In this case, although a means to manage the frequency and slot currently used with each wireless contact 2 and 3 is required, when transmitted power is weak, in order that the configuration of a cel may receive effect in a building etc. greatly like PHS, it is difficult to expect whether a lap occurs from the physical relationship of a wireless contact simply, and it is difficult [it] to judge whether a certain frequency and slot are usable.

[0014] Next, the trouble in the case of it being vacant in a migration machine side, and searching a carrier is pointed out. In this case, it will be vacant in a migration machine side, a carrier will be searched, and it will be notified to a wireless contact. Moreover, it becomes to detect generating of asynchronous interference a migration machine side. And it will be known that asynchronous interference generated the wireless contact when the signal from a migration machine stopped. Then it considers as such a configuration, there are the following troubles.

[0015] The 1st point is that a wireless contact needs to grasp all the migration machines that exist in their wireless zone first. The reason is that it detects asynchronous interference by saying that a wireless contact cannot receive the signal transmission from a mobile station which was able to receive until now.

[0016] The 2nd point is points that a wireless contact always needs to supervise the existence of the input signal of all migration machines. By this approach, when migration machines are a large number, the load of processing with a wireless contact will become large.

[0017] The 3rd point is being unable to determine which channel should be used, when a channel which is vacant from each migration machine and is different as a channel is notified, and asynchronous interference occurs.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the invention] As explained above, according to this invention, the effectiveness that generating of asynchronous interference generated in the part which two wireless zones constituted by different key station overlap is avoidable can be acquired.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the part which two wireless zones which consist of conventional asynchronous interference evasion approaches mentioned above with a different wireless contact overlap, there was a trouble that generating of asynchronous interference was nonavoidable.

[0019] The purpose of this invention is offering the asynchronous interference evasion approach generating of asynchronous interference generated in the part which two wireless zones constituted by different wireless contact overlap being avoidable.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the migration communication system of this invention In the migration communication system which consists of child offices which are communicating by the communication mode using TDMA between two or more key stations and said key station The interference investigation signal for investigating whether in case it is going to use a certain channel, asynchronous interference occurs in the channel of the use schedule is sent out to the channel of said use schedule. When [which carried out count reception] the notice signal of interference which notifies the purport which asynchronous interference generates in the receiving slot corresponding to the sending-out slot of this interference investigation signal is received or an error packet is able to be defined beforehand The key station which judges with asynchronous interference having occurred and uses channels other than said use schedule channel. When [which carried out count detection] an error packet is able to be defined beforehand, it judges with asynchronous interference having occurred, and it is characterized by consisting of child offices which send out said notice signal of interference to said key station which has sent out said interference investigation signal.
[0021] If according to this invention the key station which is going to use a certain channel sends out an interference investigation signal before using the channel, in a child office, an error packet will occur with the interference investigation signal. Therefore, a child office can know that asynchronous interference will occur, if that key station uses this channel, and it sends out the notice signal of interference to the key station which is going to use a certain channel. Thereby, if the channel is used, the key station which is going to use a certain channel can know that asynchronous interference will occur, and other channels will be used for it.
[0022] Therefore, the migration communication system which can avoid generating of asynchronous interference which may be produced in the part to which each area to cover overlaps between two key stations which cannot receive a mutual signal is realizable with a simple configuration.
[0023] Moreover, other migration communication system of this invention is set to the migration communication system which consists of child offices which are communicating by the communication mode which used TDMA between two or more key stations and said key station. The interference investigation signal for investigating whether in case it is going to use a certain channel, asynchronous interference occurs in the channel of the use schedule is sent out to the channel of said use schedule. When [which carried out count reception] the notice signal of interference which notifies the purport which asynchronous interference generates in the receiving slot corresponding to the sending-out slot of this interference investigation signal is received or an error packet is able to be defined beforehand The key station which judges with asynchronous interference having occurred and uses channels other than said use schedule channel, When the generating pattern of a key station of an error packet corresponds with the pattern which sends out said interference investigation signal, it judges with asynchronous interference having occurred, and it is characterized by consisting of child offices which send out said notice signal of interference to said key station which has sent out said interference investigation signal.
[0024] Moreover, the pattern with which a key station sends out said interference investigation signal may be the pattern which sends out an interference investigation signal for every fixed period, it may be the pattern which cannot send out an interference investigation signal for every fixed period, but sends out in the other period, and it may be the pattern from which the count which continues and transmits an interference investigation signal between the slots which do not transmit an interference investigation signal changes regularly. Furthermore, the pattern with which a key station sends out said interference investigation signal The count which may be the pattern from which the count which does not continue and transmit an interference investigation signal between the slots which transmit an interference investigation signal changes regularly, and sends out an interference investigation signal continuously, You may be the pattern from which the interference investigation signal just behind that is continuously sent out, and is twisted, and a count changes regularly, and may be the count which sends out an interference investigation signal continuously, and the pattern with which it continues, an interference investigation signal is sent out and twisted immediately after that, and a count becomes the same.
[0025] Since he is trying to judge with asynchronous interference having occurred when according to this invention a key station sends out an interference investigation signal by the pattern defined beforehand and the generating pattern of a child office of an error packet corresponds with the pattern, when the count error packet of fixed merely occurs only in succession, as compared with the case where it judges with asynchronous interference having occurred, the count sent out in an interference investigation signal can reduce.
[0026] Furthermore, you may make it said child office send out said notice signal of interference by the pattern set up beforehand. The pattern with which this child office sends out said notice signal of interference may be the pattern which sends out the notice signal of interference for every fixed period, and it may be the pattern which cannot send out the notice signal of interference for every fixed period, but sends out in the other period, and may be the pattern which changes regularly in the count which continues and transmits the notice signal of interference between the slots which do not transmit the notice signal of interference. Moreover, the pattern with which this child office sends out said notice signal of interference The count which may be the pattern from which the count which does not continue and transmit the notice signal of interference between the slots which transmit the notice signal of interference changes regularly, and sends out the notice signal of interference continuously, You may be the pattern from which the notice signal of interference just behind that is continuously sent out, and is twisted, and a count changes regularly, and may be the count which sends out the notice signal of interference continuously, and the pattern with which it continues, the notice signal of interference is sent out and twisted immediately after that, and a count becomes the same.
[0027] Since he is trying to judge with asynchronous interference having occurred when according to this invention a child office sends out the notice signal of interference by the pattern defined beforehand and the generating pattern of a key station of an error packet corresponds with the pattern, it can know certainly that asynchronous interference generated the key station which was going to use a certain channel and sent out the interference investigation signal.
[0028] Moreover, in other migration communication system of this invention, when an error packet is received in a receiving slot, said key station takes a synchronization to said notice signal of interference, and may be made to perform processing which checks that the input signal is a notice signal of interference.
[0029] Since according to this invention it can be recognized as the key station which is going to use a certain channel being a notice signal of interference and the notice signal of interference from a child office can be received, it can prevent incorrect-recognizing it as having received the error packet generated according to a certain factor, and asynchronous interference having occurred.
[0030] Furthermore, you may make it said key station send out said interference investigation signal in other migration communication system of this invention to all the transmitting slots on the carrier with which the channel of a use schedule belongs.
[0031] Furthermore, you may make it judge with asynchronous interference having generated

said key station, when the notice signal of interference is received in one which belongs on the carrier which has sent out the interference investigation signal of receiving slots or an error packet is received in other migration communication system of this invention.

[0032] Furthermore, said interference investigation signal may be a signal non-become irregular. According to this invention, since it is not necessary to newly define the notice signal of interference, it can investigate easily whether asynchronous interference has occurred.

[0033]

[Embodiment of the invention] Next, the gestalt of operation of this invention is explained to a detail with reference to a drawing.

[0034] (1st operation gestalt) Drawing 1 is the block diagram showing the configuration of the migration communication system which applies the asynchronous interference evasion approach of the 1st operation gestalt of this invention. Reference of drawing 1 constitutes this migration communication system from an assumed-parents office 113 and two or more child offices 110, 111, and 112. This migration communication system is the ad hoc network which can ***** on that spot, and is a system of the assumed-parents station mediation mold with which one set of the assumed-parents station 113 exists in one system. The internal structure of the assumed-parents station 113 and the child offices 110, 111, and 112 is the same, one set becomes an assumed-parents station out of two or more equipments which can also become an assumed-parents station or a child office, and other equipments serve as a child office.

[0035] the communication link between an assumed-parents station and a child office — this operation gestalt — the cordless handset of PHS — the carrier for a between direct message is used. TDMA-TDD (Time DivisionMultiple Access-Time Division Duplex) is used as an access method here, and a TDMA multiplex number is 4. In this migration communication system, one channel per ad hoc network is used. Although it does not carry out that an assumed-parents station takes other equipments and a synchronization but operates to the slot timing of the assumed-parents station itself, a child office takes a synchronization so that the transmitting slot of an assumed-parents station and the receiving slot of a child office may correspond, and so that the receiving slot of an assumed-parents station and the transmitting slot of a child office may correspond. In order for two or more child offices to share 1 of the slot for reception of the assumed-parents station 113 slot, it is necessary to perform collision control so that two or more child offices may not send out a packet to coincidence.

[0036] In this migration communication system, the ICMA-PE (Idle-signal Casting Multiple Access with Partial Echo) technique is used as the control approach of such a collision. In ICMA-PE, it gets down for collision control and the direction packet (it is hereafter called the direction packet for collision control of going down) is always sent out to the child office using the transmitting slot.

[0037] The child office 110 explains the actuation which takes a synchronization with reference to drawing 2 between the assumed-parents offices 113. In drawing 2, the direction packets 2001, 2002, and 2003 for collision control of going down and .. are periodically transmitted from the assumed-parents office 113, and the child office 110 can take the synchronization between the assumed-parents offices 113 by receiving these direction packets 2001, 2002, and 2003 for collision control of going down, and ..

[0038] Moreover, the configuration of these direction packets 2001, 2002, and 2003 for collision control of going down and .. is shown in drawing 3. According to drawing 3, the direction packets 2001, 2002, and 2003 for collision control of going down and .. consist of unique WORD 301, the going-down information signal 302, the free line / prohibition bit 303, reception / non-receiving bit 304, the partial echo field 305, and the error detection field 306.

[0039] Unique WORD 301 is the field for taking a synchronization, and is a certain decided bit pattern. It gets down and an information signal 302 is data transmitted from an assumed-parents station to a child office. A free line / prohibition bit 303 is used for displaying "prohibition" and forbidding access from other child offices when data are being received from a certain child office. Reception / non-receiving bit 304 displays "reception", when a signal without an error is received correctly, and when neither the case where there is an error which cannot be corrected, nor the signal is received, it indicates "un-receiving." When it indicates "un-

receiving" during signal transmission, the child office under data packet transmission halts transmit information, and goes into a resending procedure. It uses for judging whether the partial echo field 305 displays some received data, a child office collates it with this information, and the information which the local station sent is received correctly. It uses for whether the error detection field 306 has an error in the packet which received, and it checking, when judged with investigating [whether when building an ad hoc network, it is vacant in an available channel and there is any channel, and] an assumed-parents station according to a certain procedure, and it being vacant and coming out of it, the packet for collision control is continuously sent out using the channel.

[0040] Next, the configuration of the assumed-parents office in the 1st operation gestalt of this invention and a child office is shown in drawing 4. Reference of drawing 4 constitutes this equipment from the RF section 401, the clock generation section 402, the antenna section 403, the TDMA-TDD processing section 404, the ad hoc protocol processing section 405, the channel control section 406, the count storage section 407 of interference investigation packet sending out, the packet receiving result storage section 408, an interference detecting element 409, and a high order layer 410.

[0041] The RF section 401 performs transmission and reception of an electric wave, a modulation, and a recovery. The clock section 402 generates a periodic clock signal, and supplies the generated clock signal to the RF section 401 and the TDMA-TDD processing section 404. The antenna section 403 transmits and receives an electric wave. The TDMA-TDD processing section 404 performs processing about TDMA-TDD. The function to receive the data of the channel specified by the ad hoc protocol processing section 405, and to pass it to the ad hoc protocol processing section 405, The function to transmit the data specified from the ad hoc protocol processing section 405 to the channel specified using the RF section 401, The function to investigate the received field strength of the channel specified by the ad hoc protocol processing section 405, The function notified to the ad hoc protocol processing section 405 when receiving data by the specified channel and unique WORD is not able to be detected, And when data are received by the specified channel and a CRC error is detected, it has the function notified to the ad hoc protocol processing section 405.

[0042] The ad hoc protocol processing section 405 has the function which transmits and receives a control signal through the TDMA-TDD processing section 404, and the function which transmit and receive the data about the high order layer 410 through the TDMA-TDD processing section 404, in order to play the role which builds and maintains an ad hoc network. The channel control section 406 has the function to determine the channel used by investigating the opening of a channel, and this functions at the time of ad hoc network construction and interference generating.

[0043] The count storage section 407 of interference investigation packet sending out memorizes the count of sending out of the interference investigation signal which is a signal sent out in order to investigate whether asynchronous interference occurs in the channel of a use schedule.

[0044] The packet receiving result storage section 408 memorizes the receiving result (normal reception -CRC error unique WORD un-detecting / decode impossible signal) in the slot which received only the predetermined slot from the slot under current reception at the past period. The interference detecting element 409 judges whether based on whether the error packet more than a predetermined number (packets other than normal reception) is in the receiving result of the past period, asynchronous interference has generated only the predetermined slot from the slot under current reception memorized by the packet receiving result storage section 408. The high order layer 410 is application which transmits and receives data using an ad hoc protocol.

[0045] Next, actuation of the asynchronous interference evasion approach of this operation gestalt is explained to a detail with reference to a drawing.

[0046] Actuation in case the assumed-parents office 501 is holding the ad hoc network 504 using a channel ch1 as shown in drawing 5, and the assumed-parents office 502 is going to hold the ad hoc network 505 using a channel ch1 under the situation that the child office 503 has participated in this ad hoc network 504 is explained using drawing 4 – drawing 9.

[0047] Actuation of the child office 503 in the migration communication system of this operation gestalt is shown in the flow chart of drawing 6 , and actuation of the assumed-parents office 502 is shown in the flow chart of drawing 7 .
[0048] First, although the direction packet for collision control of going down is always transmitted using the transmitting slot of a channel ch1, a condition 501, i.e., an assumed-parents office, before the assumed-parents office 502 holds the ad hoc network 505, the assumed-parents office 502 explains the actuation about reception of the child office 503 in the condition that nothing has transmitted, using the flow chart of drawing 6 . In such a case, as shown in drawing 8 , the assumed-parents office 501 has transmitted periodically the direction packets 2001 and 2002 for collision control of going down, and ., and the child office 503 received these direction packets 2001 and 2002 for collision control of going down, and ., and has taken the synchronization between the assumed-parents offices 501.
[0049] Here, by the communication link between the assumed-parents station 501 and the child office 503, an error packet is not generated, but detection of unique WORD is successful, a CRC error is not detected, but it is explained, assuming the signal which the child office 503 received to be what is a signal decipherable [with the ad hoc protocol processing section 405].
[0050] Moreover, in subsequent explanation, the number of the slots which memorize the receiving result is set to N, the interference detecting element 409 sets to n1 the number of the criteria judged as asynchronous interference having occurred with the number of the error packets in a past N packet, and the packet receiving result storage section 408 sets to n2 the maximum number which sends out an interference investigation packet continuously with directions of the channel control section 406. Moreover, in the communication link between the assumed-parents station 501 and the child office 503, when the number of the error packets of a past N packet has occurred n 3 times or more, since the CHANE does not fulfill criteria communication link quality, processing which changes a channel is performed. In this case, the child office 503 sends out the channel change demand signal which notifies the purport which changes a channel to the assumed-parents station under current communication link.
[0051] In addition, N, n1, n2, and n3 are positive integer values, and they are the value of which N>n3>n2>n1 consists. For example, they are N= 240, n3=120, n2=110, and a value, such as n1=100.
[0052] First, the child office 503 receives the signal on the carrier with which a channel ch1 belongs by the RF section 401, and passes it to the TDMA-TDD processing section 404 (step 601). The TDMA-TDD processing section 404 takes out the signal of the slot of a channel ch1 from the received signal (step 602), and it judges whether unique WORD is detected (step 603). Here, if unique WORD is detected, it will be accumulated, and it is investigated whether next a CRC error is detected (step 604). Here, since a CRC error is not detected, the received signal is passed to the ad hoc protocol processing section 405 (step 605). It judges whether the ad hoc protocol processing section 405 can decode the signal (step 606), and since it is decipherable here, having received normally in the packet receiving result storage section 408 is recorded (step 607). Next, since the signal which the received signal received here although the judgment of being an interference investigation packet was performed (step 608) is the direction packet for collision control of going down, the received signal is processed in the ad hoc protocol processing section 405 (step 609).
[0053] Next, the interference detecting element 409 investigates the receiving result of a past N packet, and it is judged whether the number of error packets (unique WORD packet which is not detected [a CRC error or]) is more than n3 (step 610). Here, since the error packet is not generated, the number of error packets becomes less than [n3], and it is judged whether next the number of error packets (unique WORD packet which is not detected [a CRC error or]) is more than n1 (step 611). Here, since the number of error packets is less than [n1], special processing is not performed but the following signal is received.
[0054] Next, actuation of the assumed-parents office 502 in case the assumed-parents office 502 is going to hold the ad hoc network using a channel ch1 is explained using the flow chart of drawing 7 .
[0055] Here, as shown in drawing 5 , since the assumed-parents office 505 is located in the

outside of the ad hoc network 504, it shall be below a threshold (it sets with =E) judge that this channel is being used for the received field strength in the transmitting slot and receiving slot of the channel ch1 measured in the assumed-parents office 502. First, in order that the assumed-parents station 502 may hold an ad hoc network, ch1 is vacant and it investigates whether it is a channel. Specifically, the assumed-parents station 502 supervises [whether the field strength beyond the four continuation threshold E is detected, and] the transmitting-side slot of a channel ch1 first using the TDMA-TDD processing section 404 (step 701). In this case, the field strength beyond a threshold E is not detected from an assumption (step 702). Next, it supervises whether in a receiving-side slot, the field strength beyond the four continuation threshold E is detected similarly (step 703). Similarly in this case it is not detected (step 704). Then, the assumed-parents station 502 sets to 0 the value memorized by the count storage section 407 of interference investigation packet sending out (step 705). And an interference investigation packet is transmitted (step 706), 1 is added to the count currently recorded on the count storage section 407 of interference investigation packet sending out, and the value is stored in the count storage section 407 of interference investigation packet sending out (step 707). And it investigates whether the notice packet of interference or an error packet is received in the receiving slot immediately after transmitting an interference investigation packet (step 708). When the notice packet of interference or an error packet is not received, it judges whether the value stored in the count storage section 407 of interference investigation packet sending out is more than n2 (step 709). When the value is not more than n2, an interference investigation packet is again transmitted in the following transmitting slot (step 706).
[0056] When judged with the value stored in the count storage section 407 of interference investigation packet sending out in step 709 being more than n2, the slot which sent out the interference investigation signal does not occur, but judges that asynchronous interference is usable (step 710). It means that it was here judged with a transmitting-side slot being usable.
[0057] Next, it investigates whether it checked that the slot of both a transmitting side and a receiving side was usable (step 712). Here, since it is not checking that only a transmitting-side slot is usable, the transceiver timing of the assumed-parents station 502 is shifted a semicircle term (step 713), and it investigates shortly whether a receiving-side slot is also usable by the approach investigated by the transmitting side, and the same approach. When it judges that a receiving-side slot is usable similarly, it judges with the channel being usable (step 714).
[0058] Here, actuation of the child office 503 when an interference investigation signal is transmitted is explained using drawing 6 from the assumed-parents office 502. Since the device in which a synchronization is taken between the assumed-parents station 501 and the assumed-parents station 502 does not exist, one of the following three cases produces the child office 503 in this case.
[0059] (1) The case where the assumed-parents station 501 has transmitted [the interference investigation signal from the assumed-parents station 502] no signals also in accordance with the receiving timing and chance of the child office 503 first. Although a child office is received as an interference investigation signal in this case, since the assumed-parents station 501 has usually sent out the direction packet for collision control of going down, this is actually a rare case.
[0060] (2) Next, the case in which (2) assumed-parents station 501 has sent out a certain signal when the interference investigation signal from the assumed-parents station 502 is not in agreement with the receiving timing of the child office 503, and the interference investigation signal from the unique WORD part and the assumed-parents station 502 of the signal did not collide. In this case, the child office 503 will detect a CRC error.
[0061] (3) Moreover, the assumed-parents station 501 when the interference investigation signal from the assumed-parents station 502 is not in agreement with the receiving timing of the child office 503 and the assumed-parents station 501 has sent out no signals is the case in which the interference investigation signal from the unique WORD part and the assumed-parents station 502 of the signal collided although the signal was sent out. In this case, the child office 503 is unique WORD un-detecting.
[0062] Unless a packet loss will be carried out the middle if the assumed-parents office 502

transmits 1 9001-900n of continuation n1 time interference investigation signals as shown in drawing 9 , the case of above (1), (2), and (3) is generated continuously once [sum total n]. Actuation of the child office 503 at that time is explained using the flow chart of drawing 6 .

[0063] First, the case where (1) occurs even once among n1 times is explained. In this case, the signal of the carrier specified in the RF section 401 is received, and the TDMA-TDD processing section 404 is passed (step 601). Next, the signal of the decided slot is taken out in the TDMA-TDD processing section 404 (step 602). As a result of taking out, it investigates whether unique WORD has a CRC error next at that which is detected (step 603) (step 604). In this case, an input signal is passed to the ad hoc protocol processing section 405 noting that a CRC error is not detected (step 605). It judges whether the ad hoc protocol processing section 405 can decode the received signal (step 606). In this case, since it is decipherable, it records having carried out normal reception on the packet receiving result storage section 408 (step 607). Next, the packet which received judges whether it is an interference investigation signal (step 608). In this case, since the packet which received is an interference investigation signal, it judges with asynchronous interference having generated the interference detecting element 409, and the notice signal of interference is transmitted through the ad hoc protocol processing section 405 and the TDMA-TDD processing section 404 (step 618).

[0064] Next, when the case of (2) or (3) is generated, actuation of the child office 503 of an about is explained. In this case, it is the same as that of the case of (1) until it checks unique WORD. Next, since actuation differs by the case where the case where the case of (2) is generated, and the case of (3) are generated, it explains to according to in front of step 610, respectively.

[0065] Since unique WORD cannot be detected when the case of (3) is generated (step 603), it notifies that the TDMA-TDD processing section 404 received the unique WORD non-detected packet to the ad hoc protocol processing section 405 (step 612). Then, it records that the ad hoc protocol processing section 405 received the unique WORD non-detected packet in the packet receiving result storage section 408 (step 613).

[0066] Next, the case where the case of (2) is generated is explained. In this case, since unique WORD is detected (step 603), it judges whether next the CRC error has occurred (step 604). In this case, since a CRC error is detected, it notifies that the TDMA-TDD processing section 404 received the packet of a CRC error to the ad hoc protocol processing section 405 (step 614). Then, it records that the ad hoc protocol processing section 405 received the packet of a CRC error in the packet receiving result storage section 408 (step 615).

[0067] Henceforth, the case of the case of (2) and (3) is explained collectively again. Next, the interference detecting element 409 investigates the receiving situation of a past N packet with reference to the packet receiving result storage section 408. When the error (unique WORD un-detecting and CRC error / decode impossible) packet has occurred n 3 times or more in a past N packet, delivery sending out of the channel change demand signal is carried out at the TDMA-TDD processing section 404 (step 617). Here, since the number of error packets is n1 time, a channel change demand signal is not sent out. Next, it is judged whether the number of the error packets in a past N packet is more than n1 time (step 611). Here, since the number of the error packets memorized by the packet receiving result storage section 408 is n1, it judges with asynchronous interference having generated the interference detecting element 409, and as shown in drawing 9 , the notice signal 910 of interference is transmitted through the ad hoc protocol processing section 405 and the TDMA-TDD processing section 404 (step 618).

[0068] As explained above, the notice signal of interference is transmitted from the child office 503 about all the cases of (1), (2), and (3), respectively. Next, actuation of the assumed-parents office 502 after the notice signal of interference was sent out from the child office 503 is explained using the flow chart of drawing 7 .

[0069] In this case, the assumed-parents station 502 is whether the notice signal of interference transmitted from the child office 503 is received as a notice signal of interference, or to receive as an error packet. When the synchronization of the assumed-parents office 502 and the child office 503 can be taken by chance, the assumed-parents office 502 can recognize the notice signal of interference from the child office 503 to be a notice signal of interference, and can be

received. However, when the synchronization of the assumed-parents office 502 and the child office 503 cannot be taken, as shown in drawing 9 , the assumed-parents office 502 cannot recognize the notice signal 910 of interference from the child office 503 to be a notice signal of interference, but receives it as an error packet.

[0070] If the notice signal of interference or one signal of the error packets is received (step 703), the assumed-parents station 502 will judge with asynchronous interference having occurred, and will judge the channel that use is impossible (step 711).

[0071] In addition, even if the assumed-parents office which is effective and has not sent out the interference investigation signal like the assumed-parents office 501 of drawing 5 receives the notice signal of interference only to the assumed-parents office 502 which has transmitted the interference investigation signal, processing of what is not performed, either and it is, and the notice signal of interference is **. Moreover, the assumed-parents station 502 carries out maximum n2 (110) time sending out of the interference investigation packet. Although this value is a larger count than n1 (100) which is a threshold for the child office 503 to send out the notice packet of interference, this is for securing the robustness over the interference investigation packet which the assumed-parents station 502 sends out losing. Furthermore, when the assumed-parents office 502 receives the notice signal of interference which the child office 503 transmitted as a packet of a CRC error Also when it is not based on the notice signal of interference and generates by other factors by chance, it takes into consideration. a ****** [that asynchronous interference has occurred after making it judge with it being unusable or repeating the interference investigation by the asynchronous interference evasion approach in this operation gestalt two or more times, when continuation n5 (1<n5<n3-n2) time reception is carried out in the sense of a check] — judging — you may make .

[0072] For example, it will be set to n5=n3-n2=120-110=10 if the concrete number in this operation gestalt is applied. That is, n5 becomes between 1 to 9 in this case. Thus, it is because the child office 503 will receive an error packet 120 times or more continuously and sends out a channel change signal to the assumed-parents station 501, when having specified the upper limit makes n5 10 times or more.

[0073] As explained above, according to the migration communication system of this operation gestalt, and the asynchronous interference evasion approach, generating of asynchronous interference which may be produced in the assumed-parents office 501 which cannot receive a mutual signal, and the part to which each area to cover overlaps among 502 is avoided, and it becomes possible to realize without moreover using a complicated controlling mechanism.

[0074] The reason is as follows. First, before an assumed-parents station uses a channel, multiple-times sending out of the interference investigation packet is carried out. Then, asynchronous interference occurs in the duplication part of area by it. If asynchronous interference occurs, the child office which exists there will notify that to the assumed-parents station which is going to use the channel for generating of asynchronous interference with the notice signal of interference. Then, the assumed-parents station which is going to use a channel makes the notice signal of interference the notice signal of interference, or it receives as an error packet. It can know that asynchronous interference has generated by this the assumed-parents office which is going to use a channel. Thus, since generating of asynchronous interference detects [the notice from a child office] by the asynchronous interference evasion approach of this operation gestalt, complicated control which grasps all the child offices where an assumed-parents station exists in area, and supervises each child office is unnecessary.

[0075] (2nd operation gestalt) Next, the migration communication system of the 2nd operation gestalt of this invention and the asynchronous interference evasion approach are explained.

[0076] The configuration of the assumed-parents office in the migration communication system of this operation gestalt and a child office is shown in drawing 10 . To the configuration which showed the assumed-parents office and child office in this operation gestalt to drawing 4 , the interference detecting element 409 and the channel control section 406 replace the interference detecting element 1009 and the channel control section 1006, respectively, the count storage section 407 of interference investigation packet sending out is deleted, and the interference investigation signal sending-out pattern storage section 1007 is newly added.

[0077] The interference investigation signal sending-out pattern storage section 1007 has memorized the sending-out pattern of an interference investigation signal. The concrete example of the sending-out pattern of the interference investigation signal memorized by this interference investigation signal sending-out pattern storage section 1007 is shown in drawing 11 .

[0078] This sending-out pattern For example, a pattern which sends out an interference investigation signal every (1) fixed period (drawing 11 RO 1 (a)), Or an interference investigation signal cannot be sent out every fixed period, but the pattern (drawing 11 (b)) and (2) interference investigation signals of sending out are sent out in the other period (or), an interference investigation signal is sent out and there is nothing — a pattern (drawing 11 (c) —) to which spacing is made to increase in proportion to time amount The count which sends out a drawing 11 (d) (3) interference investigation signal, and a pattern to which an interference investigation signal is sent out and twisted and a count is made to increase in proportion to time amount (drawing 11 (e)), (4) The count which the interference investigation signal sent out, and the interference investigation signal just behind that are sent out and twisted, a count is made the same, and the count which sends out an interference investigation signal can consider a pattern, such as a pattern (drawing 11 (f)) which is changed at random. As long as this sending-out pattern is a pattern beforehand defined besides the above, it may be what kind of pattern.

[0079] The interference detecting element 1009 in this operation gestalt sends out the notice signal of interference, when in agreement with the sending-out pattern with which the generating pattern of an error packet is memorized by the interference investigation signal sending-out pattern storage section 1007. Moreover, the channel control section 1006 in this operation gestalt sends it out with the sending-out pattern memorized by the interference investigation signal sending-out pattern storage section 1007 rather than sends out an interference investigation signal continuously.

[0080] Next, actuation of the migration communication system of this operation gestalt is explained.

[0081] With this operation gestalt, in case an interference investigation signal is sent out before the assumed-parents station 502 uses a channel, there is nothing then and it is sent out according to the pattern which is sent out continuously and which is memorized by the interference investigation signal sending-out pattern storage section 1007. As for this pattern, it is desirable for the pattern which an error packet may generate in the actual field to be a completely different pattern.

[0082] Next, actuation in case a child office sends out the notice packet of interference is explained. The interference detecting element 1009 of the child office 503 is serially collated with the receiving result memorized by the packet receiving result storage section 408 and the sending-out pattern memorized by the interference investigation signal sending-out pattern storage section 1007. Since it can judge with what asynchronous interference has generated immediately when an interference investigation packet is received, the child office 503 sends out the notice signal of interference immediately. In such a case, the interference detecting element 1009 sends out the notice signal of interference to except, when in agreement with the sending-out pattern with which the generating pattern of an error packet is memorized by the nterference investigation signal sending-out pattern storage section 1007. The assumed-parents station 502 which is going to use the channel ch1 supervises whether the notice signal of nterference or an error packet is received, after sending out the pattern memorized by the nterference investigation signal sending-out pattern storage section 1007. When the notice acket of interference is received at this time or an error packet is received, the assumed-arents office 502 which is going to use the channel ch1 can know generating of asynchronous nterference. In this case, in order to secure certainty, as a result of repeating this pattern everal times, you may judge.

0083] This operation gestalt can reduce the count which sends out an interference investigation gnal by using the pattern which is hard to generate in the actual field as a sending-out pattern an interference investigation signal.

0084] (3rd operation gestalt) Next, the migration communication system of the 3rd operation

gestalt of this invention and the asynchronous interference evasion approach are explained.

[0085] The configuration of the migration communication system of this operation gestalt is the same as the configuration shown in drawing 4 , and when the synchronization cannot be taken between the assumed-parents office 502 and the child office 503, performing processing which shifts receiving timing so that the assumed-parents office 502 may take the synchronization with the notice signal of interference sent out from the child office 503 only differ.

[0086] The actuation in the migration communication system of this operation gestalt is shown in drawing 12 . To the midst to which the assumed-parents station 502 which is going to use a channel with this operation gestalt has sent out the interference investigation signals 9001 and 9002 and .. When an error packet (error packet by the notice signal 9101 of interference) is received in a receiving slot, the assumed-parents station 502 which is going to use the channel ch1 it stops sending out an interference investigation signal, and it tries so that a synchronization may be taken to these notice signals 9101, 9102, and 9103 of interference, and .. As a result of a synchronization being able to take and receiving, when it is a notice signal of interference (notice signal 9103 of interference), it is recognized as interference having occurred and use of the channel is suspended. When it is impossible to take a synchronization, it judges whether it tries repeatedly several times and the channel ch1 is used.

[0087] In addition, only sufficient count needs to send out the notice signal of interference so that the assumed-parents office 502 which is going to use the channel may stop sending out of the interference investigation signals 9001 and 9002 and .. and the child office 503 which detected asynchronous interference in this case can take a synchronization to the notice signals 9101, 9102, and 9103 of interference, and ..

[0088] Since according to this operation gestalt it can be recognized as the assumed-parents office 502 which is going to use the channel ch1 being a notice signal of interference and the notice signal of interference from the child office 503 can be received, it can prevent incorrect-recognizing it as having received the error packet generated according to a certain factor, and asynchronous interference having occurred.

[0089] (4th operation gestalt) Next, the migration communication system of the 4th operation gestalt of this invention and the asynchronous interference evasion approach are explained. The configuration of the assumed-parents office in the migration communication system of this operation gestalt and a child office is shown in drawing 13 . To the configuration which showed the assumed-parents office and child office in this operation gestalt to drawing 4 , the interference detecting element 409 and the channel control section 406 replace the interference detecting element 1209 and the channel control section 1206, respectively, and the notice signal sending-out pattern storage section 1211 of interference is newly added.

[0090] The notice signal sending-out pattern storage section 1211 of interference memorizes the pattern which sends out the notice signal of interference. As a concrete example of the sending-out pattern of the notice signal of interference memorized by this notice signal sending-out pattern storage section 1211 of interference, a pattern as shown in drawing 1111 can be used.

[0091] That is, the sending-out pattern memorized by the notice signal sending-out pattern storage section 1211 of interference For example, a pattern which sends out the notice signal of interference every (1) fixed period (drawing 11 (a)), Or the notice signal of interference cannot be sent out every fixed period, but the pattern (drawing 11 (b)) and the notice signal of (2) interference of sending out are sent out in the other period (or), the notice signal of interference is sent out and there is nothing — a pattern (drawing 11 (c) —) to which spacing is made to increase in proportion to time amount The count which sends out the notice signal of drawing 11 RO 1(d)(3) interference, and a pattern to which the notice signal of interference is sent out and twisted and a count is made to increase in proportion to time amount (drawing 11 (e)), (4) The count which the notice signal of interference sent out, and the notice signal of interference just behind that are sent out and twisted, a count is made the same, and the count which sends out the notice signal of interference can consider a pattern, such as a pattern (drawing 11 (f)) which is changed at random. As long as this sending-out pattern is a pattern beforehand defined besides the above, it may be what kind of pattern.

[0092] When asynchronous interference is detected, the interference detecting element 1209 in this operation gestalt continues the notice signal of interference, and does not send it out, but it sends out the notice signal of interference based on the sending-out pattern memorized by the notice signal sending-out pattern storage section 1211 of interference. Moreover, the error packet is a notice signal of interference, and the channel control section 1206 in this operation gestalt judges with asynchronous interference having occurred, when the pattern of the error packet which received is in agreement with the sending-out pattern memorized by the notice signal sending-out pattern storage section 1211 of interference.
[0093] Next, actuation of the migration communication system of this operation gestalt is explained.
[0094] With this operation gestalt, in case the child office 503 sends out the notice signal of interference, it sends out the notice signal of interference based on the sending-out pattern currently recorded on the notice signal sending-out pattern storage section 1211 of interference rather than sends out the notice signal of interference continuously.
[0095] As for this pattern, it is desirable for the pattern which an error packet may generate in the actual field to be a completely different pattern.
[0096] And when the pattern with which the assumed-parents office 502 which has sent out the interference investigation signal receives an error packet, and receives the error packet is the same as the pattern currently recorded on the notice signal sending-out pattern storage section 1211 of interference, it recognizes as asynchronous interference having generated the assumed-parents office 502 which has sent out the interference investigation signal, and judges that the channel ch1 cannot be used.
[0097] Thus, it can know that asynchronous interference has generated more certainly the assumed-parents office 502 which has sent out the interference investigation signal by sending out the notice signal of interference with the pattern which is recorded on the notice signal sending-out pattern storage section 1211 of interference and which was defined beforehand.
[0098] (5th operation gestalt) Next, the migration communication system of the 5th operation gestalt of this invention and the asynchronous interference evasion approach are explained.
[0099] The fundamental configuration of the migration communication system of this operation gestalt is the same as the configuration shown in drawing 4 , and only a part of the actuation differs.
[0100] With this operation gestalt, when it is going to use the slot of a carrier with the assumed-parents station 502, an interference investigation signal is not sent out only to the slot of the carrier, but an interference investigation signal is sent out to all the transmitting slots on a carrier. Similarly, reception actuation of the notice signal of interference does not perform only the slot which is going to use a certain carrier, either, but is performed about all the receiving slots on the carrier. It not only avoids generating of asynchronous interference generated when two or more assumed-parents offices use the same slot, but according to this operation gestalt, it is avoidable to use the same carrier. And if a different carrier between different assumed-parents stations is used, naturally asynchronous interference will not be generated.
[0101] By the asynchronous interference evasion approach by this operation gestalt, trying not to be used by the assumed-parents station from which two slots on one carrier differ as mentioned above is based on the following reasons.
[0102] If it checks that asynchronous interference has not occurred in case it is originally going to use a certain slot, even if a different assumed-parents station uses two slots on one carrier, the problem by asynchronous interference should not be generated. However, asynchronous interference which the clock signal which serves as criteria with time amount progress shifted, and had not been generated at the beginning-of-using time may occur with time amount progress according to the difference of the precision of Xtal built in an assumed-parents office.
[0103] Therefore, if it is made not to be used by the assumed-parents office where two slots on one carrier differ, asynchronous interference generated with time amount progress is also completely avoidable.
[0104] However, although generating of asynchronous interference is avoidable if it avoids that two or more slots are used on the carrier same in this way Since circuit capacity falls, when the

circuit is vacant in fact When the slot used by each assumed-parents station by the asynchronous interference evasion approach of this operation gestalt was made to be distributed by each carrier and a circuit is crowded After checking that asynchronous interference does not occur per slot using the asynchronous interference evasion approach by other operation gestalten, two or more slots on one carrier will be used.
[0105] (6th operation gestalt) Next, the migration communication system of the 6th operation gestalt of this invention and the asynchronous interference evasion approach are explained.
[0106] Although the fundamental configuration of the migration communication system of this operation gestalt is the same as the configuration shown in drawing 4 , the point that it can direct to send out a signal from the ad hoc protocol processing section 405 in no becoming irregular to the TDMA-TDD processing section 404 differs from the point that it can be directed that the TDMA-TDD processing section 404 sends out a signal in no becoming irregular to the RF section 401.
[0107] Next, actuation of the migration communication system of this operation gestalt is explained. Although actuation of the migration communication system of this operation gestalt is fundamentally the same as the 5th operation gestalt, a certain signal is sent out in no becoming irregular instead of sending out an interference investigation signal. The signal sent out here does not need to be an interference investigation signal. The effectiveness of this operation gestalt is the point that interference investigation is easily realizable, by conducting interference investigation at the point that it is not necessary to newly define the notice signal of interference, by the approach of only not performing the place originally modulated.
[0108] (7th operation gestalt) Next, the migration communication system of the 7th operation gestalt of this invention and the asynchronous interference evasion approach are explained.
[0109] Although the fundamental configuration of the migration communication system of this operation gestalt is the same as the configuration shown in drawing 4 , the point that the transmitted power of a signal can be directed from the ad hoc protocol processing section 405 to the TDMA-TDD processing section 404 differs from the point that the transmitted power of a signal can be directed from TDMA-TDD404 to the RF section 401.
[0110] Next, actuation of the migration communication system of this operation gestalt is explained. With this operation gestalt, weak transmitted power sends out an interference investigation signal at first. And gradually, if the notice signal of interference from a child office is not detected, transmitted power is repeatedly investigated until it finally results in the maximum transmitted power which can be sent out with slight strength. If the notice signal of interference from a child office is not detected even if it sends out an interference investigation signal with the maximum transmitted power, it judges with the ability of the slot to be used. Although there is a problem that interference occurs in a child office and the communication link of a child office becomes impossible when an assumed-parents office sends out an interference investigation signal, with this operation gestalt, it is effective in it being [the number of the child offices which interference generates] minimum-hard, and being able to stop it by extending gradually the range at which the notice signal of interference arrives.
[0111] Although the 7th operation gestalt explained using the migration communication system which used the ad hoc protocol with which the assumed-parents station and the child office have the same composition as migration communication system from the above 1st This invention is not limited to this, and even when the usual migration communication system which consists of a migration machine which is a child office as shown in drawing 14 , and a wireless contact which is a key station is used, it can be applied similarly.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the block diagram showing the configuration of the migration communication system which applies the asynchronous interference evasion approach of the 1st operation gestalt of this invention.

[Drawing 2] It is drawing for explaining the actuation whose child office 110 takes a synchronization between the assumed-parents stations 113.

[Drawing 3] They are the direction packet 2001 for collision control of going down sent out from the assumed-parents station 113, and drawing showing the configuration of ..

[Drawing 4] It is the block diagram showing the configuration of the assumed-parents station of the 1st operation gestalt of this invention, and a child office.

[Drawing 5] It is drawing for explaining actuation of the migration communication system of the 1st operation gestalt of this operation gestalt.

[Drawing 6] drawing 5 — a core — it is the flow chart which shows actuation of an office 503.

[Drawing 7] It is the flow chart which shows actuation of the assumed-parents office 502 in drawing 5.

[Drawing 8] Performing actuation in which the child office 503 takes a synchronization between the assumed-parents stations 501, the assumed-parents station 502 is drawing explaining the case where it is not operating.

[Drawing 9] While the child office 503 is performing actuation which takes a synchronization between the assumed-parents stations 501, the assumed-parents station 502 is drawing explaining the case where the ****** investigation signal is transmitted.

[Drawing 10] It is the block diagram showing the configuration of the assumed-parents station in the migration communication system of the 2nd operation gestalt of this invention, and a child office.

[Drawing 11] It is drawing showing the concrete example of the sending-out pattern of the interference investigation signal memorized by the interference investigation signal sending-out pattern storage section 1007 in drawing 10.

[Drawing 12] It is drawing showing the actuation in the migration communication system of the 3rd operation gestalt of this invention.

[Drawing 13] It is the block diagram showing the configuration of the assumed-parents station in the migration communication system of the 4th operation gestalt of this invention, and a child office.

[Drawing 14] It is drawing showing the configuration of the conventional migration communication system using the asynchronous interference evasion approach.

[Drawing 15] It is the block diagram showing the configuration of the wireless contacts 2-5 in drawing 14.

[Drawing 16] It is drawing for explaining actuation of the migration communication system which adopted the conventional asynchronous interference evasion approach.

[Description of Notations]

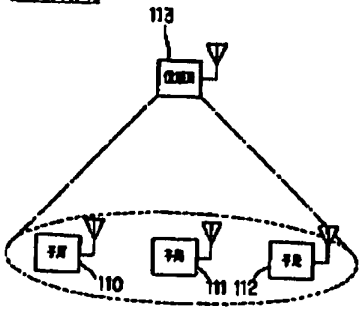
1 Wireless Communication Control Unit
2-5 Wireless contact

6-9 Migration machine
10A-10D Wireless zone
101 Antenna Section
102 Wireless Section
103 Modem Section
104 Frame Generation / Decomposition Section
105 Control Channel Control Section
106 Communication Channel Control Section
107 Asynchronous Interference Detecting Element
108 Interface Section
109 Slot Synchronizer
2001, 2002, 2003, .. The direction packet for collision control of going down
301 Unique WORD
302 Get Down and it is Information Signal.
303 Free Line / Prohibition Bit
304 Reception / Non-Receiving Bit
305 Partial Echo Field
306 Error Detection Field
401 The RF Section
402 Clock Generation Section
403 Antenna Section
404 TDMA-TDD Processing Section
405 Ad Hoc Protocol Processing Section
406 Channel Control Section
407 Count Storage Section of Interference Investigation Packet Sending Out
408 Packet Receiving Result Storage Section
409 Interference Detecting Element
410 High Order Layer
501 502 Assumed-parents station
503 Child Office
504 505 Ad hoc network
601-618 Step
701-714 Step
9001, 9002, .. Interference investigation signal
910 Notice Signal of Interference
1006 Channel Control Section
1007 Interference Investigation Signal Sending-Out Pattern Storage Section
1009 Interference Detecting Element
1206 Channel Control Section
1209 Interference Detecting Element
1211 Notice Signal Sending-Out Pattern Storage Section of Interference

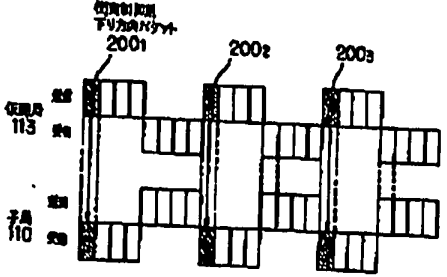
[Translation done.]

DRAWINGS

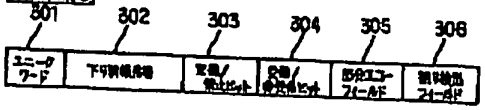
[Drawing 1]



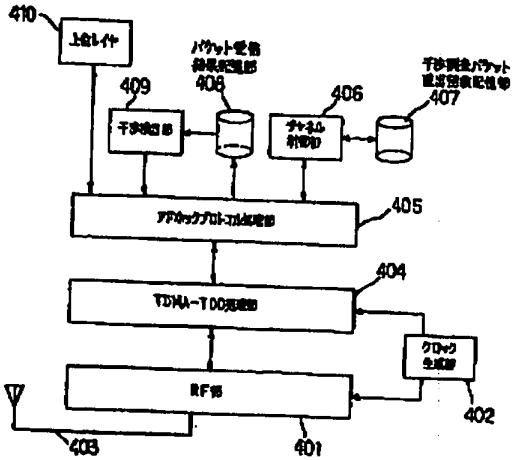
[Drawing 2]



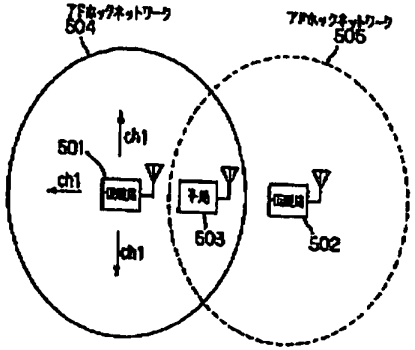
[Drawing 3]



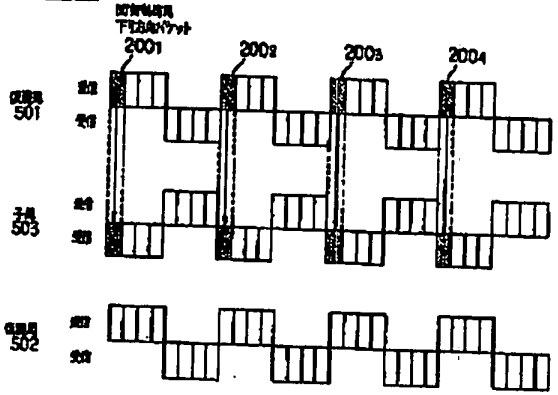
[Drawing 4]



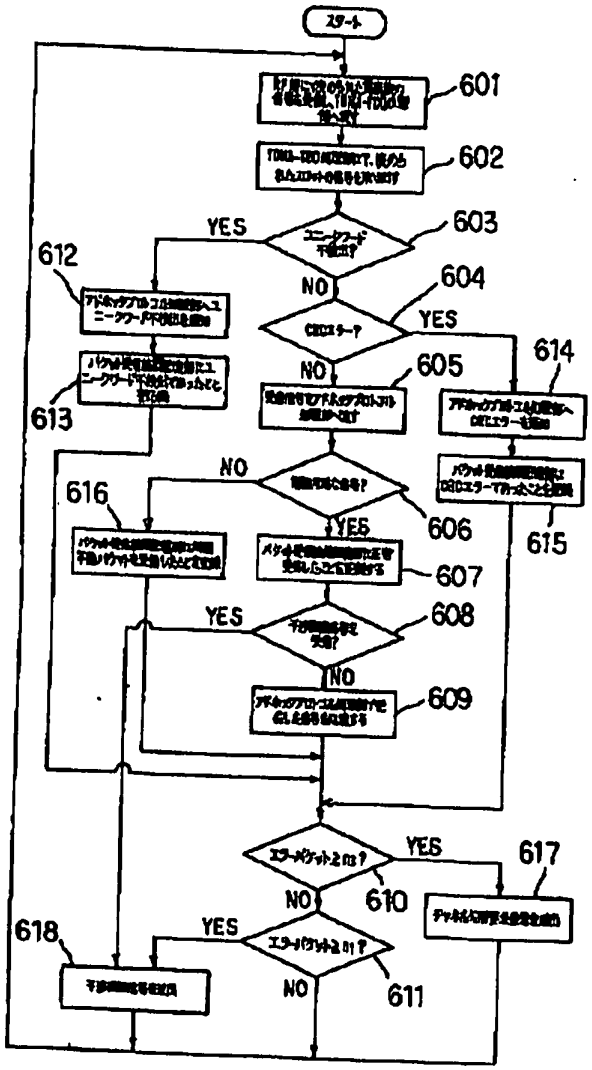
[Drawing 5]



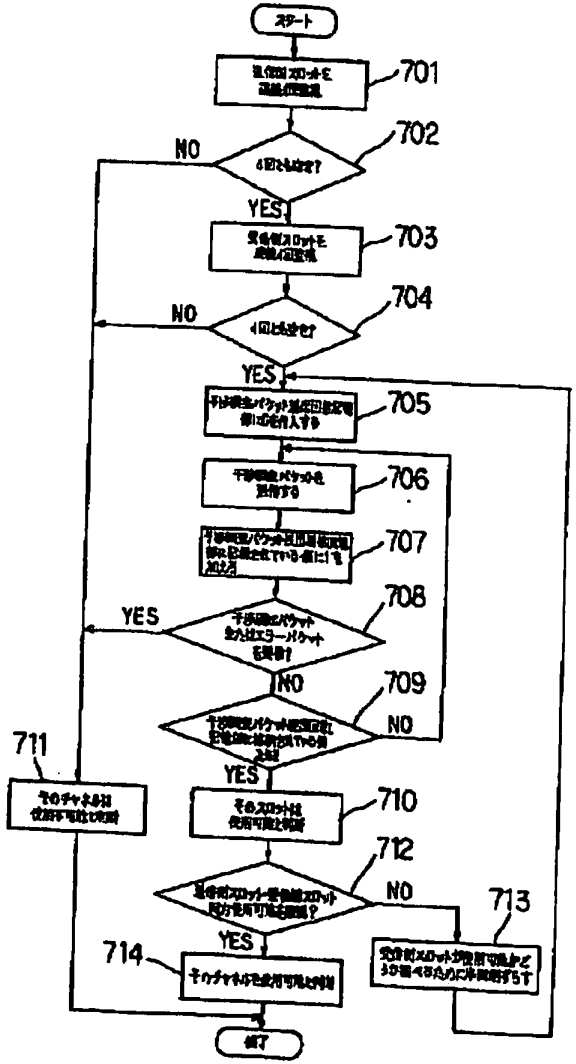
[Drawing 8]



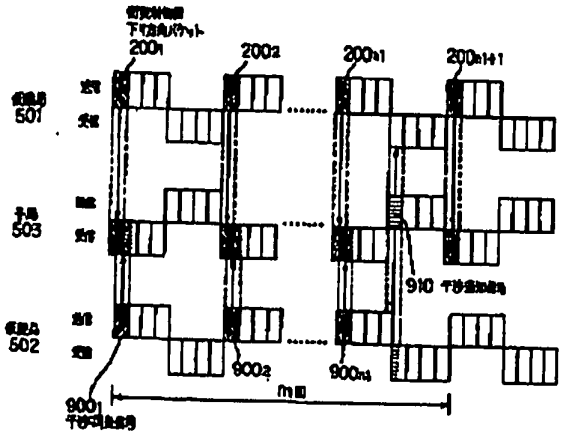
[Drawing 6]



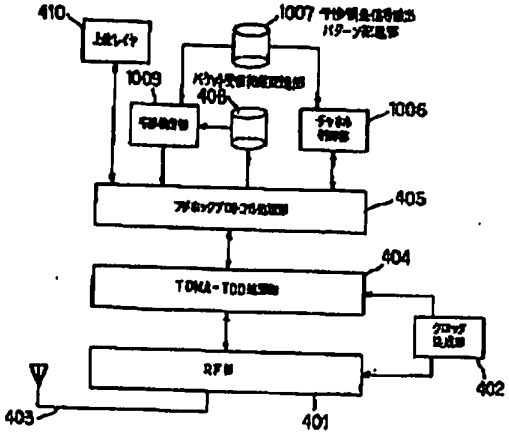
[Drawing 7]



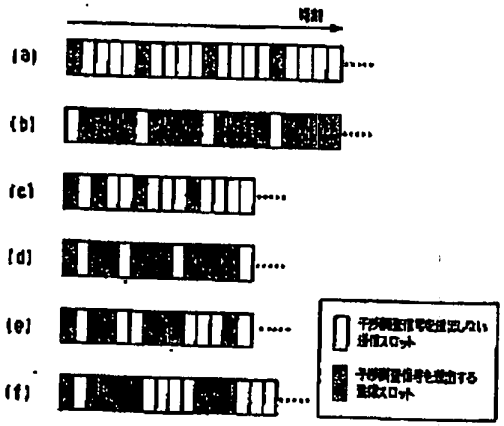
[Drawing 9]



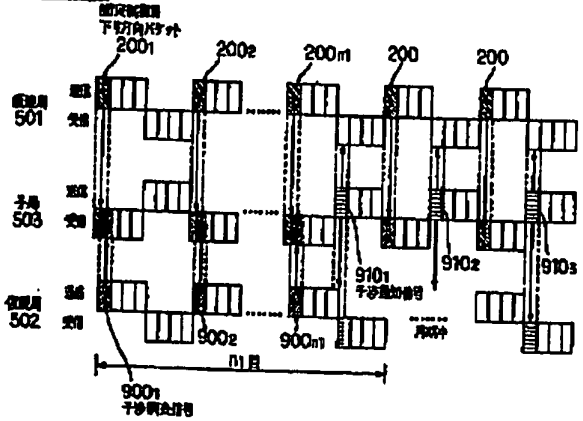
[Drawing 10]



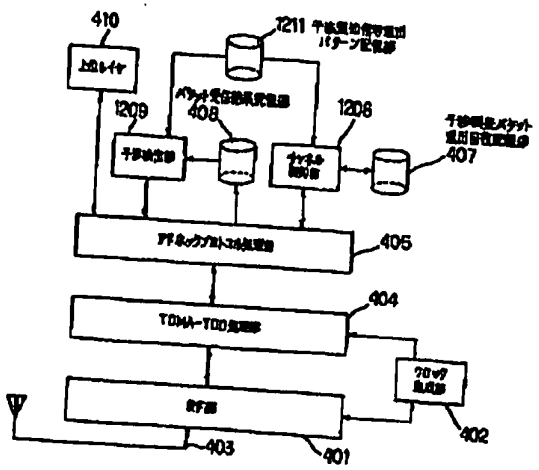
[Drawing 11]



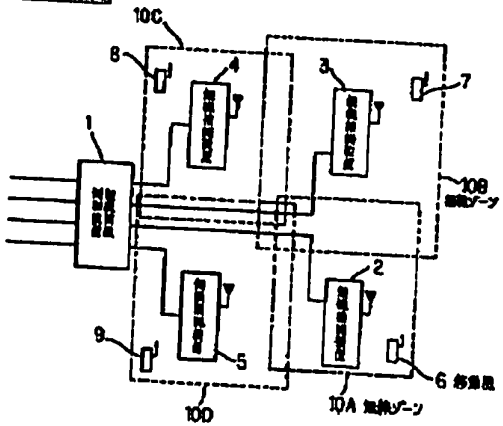
[Drawing 12]



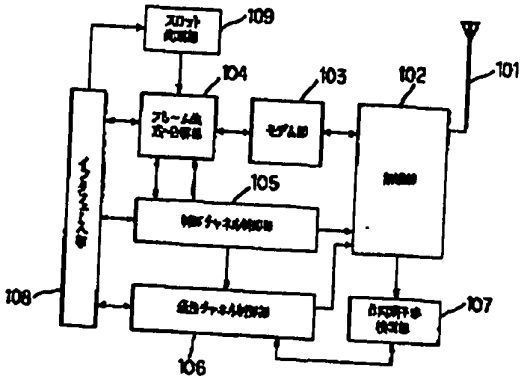
[Drawing 13]



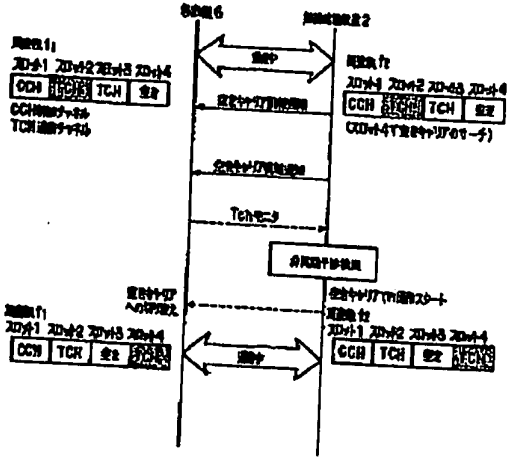
[Drawing 14]



[Drawing 15]



[Drawing 16]



[Translation done.]